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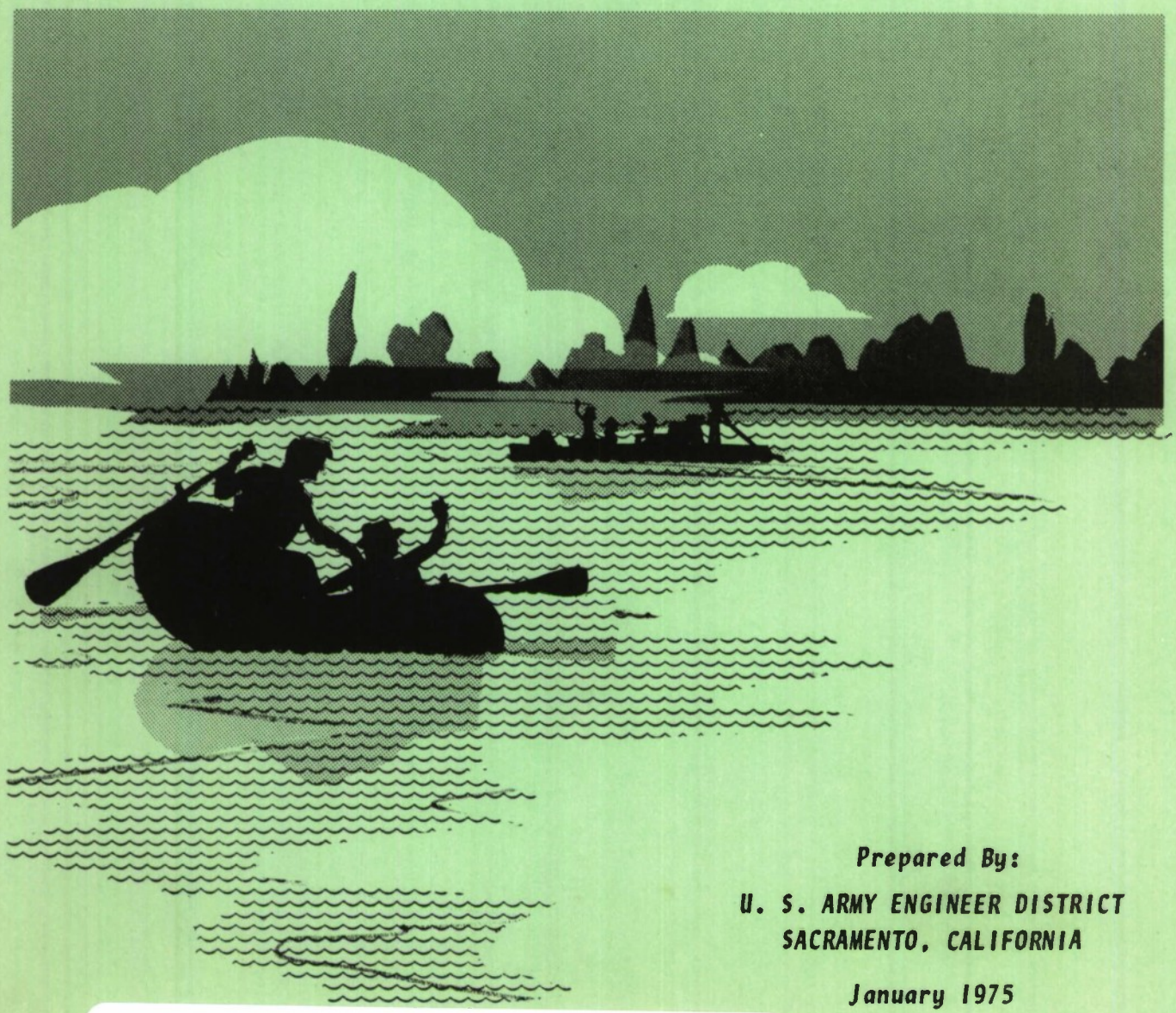
SACRAMENTO RIVER, CHICO LANDING
TO RED BLUFF, CALIFORNIA
BANK PROTECTION PROJECT

RECORD COPY

Final environmental statement



Prepared By:
U. S. ARMY ENGINEER DISTRICT
SACRAMENTO, CALIFORNIA

January 1975

20081029160

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SACRAMENTO RIVER
CHICO LANDING TO RED BLUFF
CALIFORNIA
BANK PROTECTION PROJECT

FINAL
ENVIRONMENTAL STATEMENT

Prepared By:
U. S. ARMY ENGINEER DISTRICT
SACRAMENTO, CALIFORNIA

JANUARY 1975

SUMMARY

Sacramento River
Chico Landing to Red Bluff, California
Bank Protection Project

( ) Draft (X) Final Environmental Impact Statement

Responsible Office: U. S. Army Engineer District, Sacramento, California

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The plan of improvement is the installation of bank protection at intermittent sites along Sacramento River from Chico Landing to Red Bluff as shown on Chart 1.

3. a. Environmental Impacts: The project will prevent continuing bank erosion and the loss of riparian lands, vegetation, and residences. It will also prevent major channel changes. The installation of bank protection will result in the loss of some riparian lands and vegetation.

b. Adverse Environmental Effects: Loss of aesthetics, wildlife, and other natural riparian values of the river cannot be avoided at some sites. However, such values will ultimately be lost to erosion if the project is not constructed.

4. Alternatives: Deferring or deleting the work; the use of various materials for bank protection; upstream storage.

5. Comments requested:

a. Federal. -

Environmental Protection Agency

Department of Interior - Fish and Wildlife Service
Bureau of Outdoor Recreation
National Park Service
Bureau of Reclamation
Bureau of Land Management

Department of Commerce - National Marine Fisheries Service
National Oceanic & Atmospheric Administration

Department of Transportation

Department of Agriculture - Soil Conservation Service

b. State and local. -

State of California

Office of Intergovernmental Management

Resources Agency - Reclamation Board
Department of Fish and Game
Department of Water Resources, Northern District
Department of Parks and Recreation
Central Valley Regional Water Quality Control Board
Department of Conservation
Department of Navigation and Ocean Development

Department of Public Health

Butte County Board of Supervisors

Glenn County Board of Supervisors

Tehama County Board of Supervisors

c. Cities and Communities. -

Chico
Tehama
Red Bluff

d. Other organizations and individuals. -

Sierra Club, Mother Lode Chapter

Altacol Chapter, Audubon Society

California Trout

The Wildlife Society

California Natural Areas Coordination Committee

Citizen's Environmental Advisory Committee

League of Women Voters

FINAL
ENVIRONMENTAL IMPACT STATEMENT

SACRAMENTO RIVER
CHICO LANDING TO RED BLUFF, CALIFORNIA
BANK PROTECTION PROJECT

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CHICO LANDING TO RED BLUFF, CALIFORNIA
BANK PROTECTION PROJECT

1.01. Project description. (1) - The Sacramento River Chico Landing to Red Bluff Bank Protection Project was authorized by the Flood Control Act of 1958 as contained in Public Law 85-500 (2), 3 July 1958, 85th Congress, 1st Session, in accordance with the plans and subject to the conditions recommended by the Chief of Engineers, in House Document No. 272 (3), 84th Congress, 2d Session. The Corps of Engineers is authorized to provide bank protection and incidental channel improvements on Sacramento River between Chico Landing and Red Bluff in Butte, Glenn, and Tehama Counties at certain sites found to be economically feasible at the time of construction and in light of conditions then prevailing along the river. The authorized plan also provides that the existing project for flood control on Sacramento River be extended to Keswick Dam for the purpose of zoning the area below the dam. Flood plain zoning was included as a local interest requirement. The Reclamation Board, State of California, has adopted a primary floodway for the Sacramento River from Chico Landing to Red Bluff, and Butte and Glenn Counties have adopted ordinances zoning the secondary floodways. The Reclamation Board has also furnished the assurances to (a) maintain the completed bank protection work; (b) furnish all lands, easements, and rights-of-way necessary for construction and maintenance of the project; and (c) hold and save the United States harmless from damages resulting from construction of the project.

1.02. In General Design Memorandum No. 1 (4), dated 1 August 1961, bank protection was found to be economically justified at three erosion sites in Butte County, at one site in Glenn County, and at seven sites in Tehama County. The following table lists the site locations:

County	River Mile	Bank	Length 1/
Butte	194.0	Left	2,800 ft.
Butte	196.3	Left	2,100 ft.
Glenn	197.0	Right	8,200 ft.
Butte	203.8	Left	4,700 ft.
Tehama	219.4	Left	2,580 ft.
Tehama	220.3	Right	4,800 ft.
Tehama	234.2	Left	2,040 ft.
Tehama	234.7	Left	2,140 ft.
Tehama	237.2	Right	3,740 ft.
Tehama	239.1	Left	2,650 ft.
Tehama	240.0	Left	2,700 ft.

1/ Lengths of sites 219.4 through 240.2 are actual constructed lengths.

1.03. Tehama County adopted satisfactory flood plain zoning ordinances, and the project works have been completed in that County. In addition to the seven Tehama County sites approved in General Design Memorandum No. 1, three additional sites were subsequently approved and constructed at the following locations:

County	River Mile	Bank	Length
Tehama	218.3	Left	587 ft.
Tehama	229.2	Right	500 ft.
Tehama	235.8	Left	2,600 ft.

The units in Butte and Glenn Counties were placed in an inactive status in 1963 pending action by those counties to comply with the flood plain zoning requirements.

1.04. The Reclamation Board, State of California, adopted a designated primary floodway plan for the Sacramento River from Chico Landing to Red Bluff, and Butte and Glenn Counties adopted special County ordinances (5)(23) to control structures within the secondary floodways. The combination of primary floodway designation and County ordinances satisfied the requirements for flood plain zoning. In September 1971 the Chief of Engineers approved reactivation of the Butte County portion of the Chico Landing to Red Bluff Project, and the Glenn County portion of the project in December 1972.

1.05. Of the six sites which have been authorized in Butte and Glenn Counties, bank protection at the Wilson Landing site at mile 203.8 left bank is no longer required because the river has changed course, and erosion is no longer active at that site. Seven additional erosion sites, caused by the channel changes, at miles 202.0 right bank; 202.4, 206.1, 207.0, 211.1 left bank; and 229.0 right bank and 230.5 left bank, have been determined to be economically justified, and approval is being requested to include those sites in the project. The latter two sites have been added to the environmental statement since publication of the draft statement and receipt of comments. The comments received are applicable to these two sites. Another erosion site at 205.5 left bank was identified but found not to be economically justified at this time. New erosion sites are currently being identified throughout the reach of the river between Chico Landing to Red Bluff. These erosion problems are similar to those described in detail in this statement. Erosion of the river banks is causing loss of valuable agricultural land, wildlife habitat, and in some instances, threatening the loss of residences and appurtenant structures. Construction of bank protection at those sites found to be economically justified and environmentally sound will also be similar to that described in detail in this statement. Comments received on the draft environmental statement are applicable to new erosion sites currently developing on the river.

WORK REMAINING TO COMPLETE
BUTTE, GLENN, AND TEHAMA COUNTY SITES

GDM Desc.	Site	County	Bank	Length	Status
148.1	197.0	Glenn	Right	8,200 ft	Approved
--	202.0	Glenn	Right	1,200 ft	Under consideration
--	202.4	Butte	Left	1,200 ft	Under consideration
*154.1	203.8	Butte	Left	4,700 ft	Approved but no longer being considered for construction
--	205.5	Butte	Left	1,400 ft	Under consideration
--	206.1	Butte	Left	800 ft	Under consideration
--	207.0	Butte	Left	1,400 ft	Under consideration
--	211.1	Butte	Left	1,000 ft	Under consideration
--	229.0	Tehama	Right	3,500 ft	Under consideration
--	230.5	Tehama	Left	3,200 ft	Under consideration

*Denotes sites approved for modified design; description given in following paragraphs.

1.06. The method of construction originally authorized was to construct the bank to a 1 vertical on 2 horizontal slope (see Charts 2 and 3) and place an 18-inch-thick layer of quarry rock extending from 5 feet below stream thalweg (lowest part of the streambed) up to the low water elevation and place a 12-inch-thick layer of quarry rock from low water up to the top of bank or to flood plane elevation (see Chart 2). However, at site miles 203.8 (no longer being considered), 208.4, and 213.1, a modified plan has been approved by the Chief of Engineers so that the top of rock will terminate at the sustained high water elevation (see Chart 3). The modified plan was developed from recent studies (25) in which it was determined that the major cause of bank erosion was from wave action from the wakes of power boats. Such wave action may be seen in photograph 1. However, in the northern reaches of the river where recreational boating does not occur as often as in areas below Sacramento, erosion from wave action is not as much of a major cause of bank erosion. During most of the year, banks become saturated from the continuing low flows and then slough away when the upper portions of the bank become saturated from high floodflows during the winter months. One of the purposes of these studies was also to determine methods by which riparian habitat could be protected and preserved. The modified plan also costs less because less rock per lineal foot is required. An example of the standard method of construction may be seen on the left side of photograph 2 and the modified plan on the right. Approval will be requested to implement the modified plan at all future sites unless channel velocities are found to be excessively high during floodflows (an average of 10 f.p.s. or greater for a cross-section) or if soils are found to be extremely friable. A mixture of soft chess (Bromis mollis) and annual ryegrass (lolium multiflorum) will be seeded at a rate of 20 lbs/acre on the bank above the rock for

erosion control. Seeded areas are fertilized to assist in good germination. Willow sprigs will be planted in scarred areas above the rock. The river stage will be below the sustained high water flow line at least 90 percent of the time during the year. The sustained flow varies from 20,000 cubic feet per second at Red Bluff to 24,000 cubic feet per second at Chico Landing. The existing bank will be cleared of brush or other vegetation up to the top of the rock within the work sites. In areas where trees or significant wildlife habitat exist, the stone protection will be constructed in accordance with the modified plan (see chart 3) instead of sloping the bank back from the toe and removing the adjacent trees and habitat. Material from bank sloping will be wasted along the top of bank where vegetation will not be affected, or used as embankment. Quarry rock is available locally from existing nearby sources.

1.07. The Federal cost of the work including engineering costs for the eight new sites in Butte, Glenn, and Tehama Counties is estimated to be $1,150,000 based on July 1974 price levels. (The Federal cost of Site Mile 197.0R, the only previously authorized site remaining to be constructed is estimated at $380,000). A condition of the authorization is that the cost of protection provided at each site must be economically justified, with benefits exceeding the costs; therefore, a benefit-cost ratio has been calculated for each site rather than for the entire project. Benefit to cost ratios for the sites remaining to be constructed, based on 2-5/8 percent interest rate for Federal costs (established by the Treasury Department[1]) and 4.0 percent for local interest costs, both at July 1974 price levels, and a 50-year amortization period are as follows:

1/ The interest rate for a project is set at the rate in effect at the time when funds for construction are appropriated by the Congress, and provided that the State or a local agency has given satisfactory assurances of local cooperation. The State Reclamation Board had provided these assurances. This policy is consistent with instructions from the Water Resources Council and in consonance with the policies of the Congress.

Site	Annual Cost $	Annual Benefits $	B/C Ratio
194.0L*	8,050	20,800	2.6
196.3L*	10,900	12,400	1.1
197.0R	15,400	22,800	1.5
202.0R	4,700	14,400	3.1
202.4L	4,000	8,200	2.1
205.5L	2,800	Negligible	-
206.1L	2,500	5,700	2.3
207.0L	4,100	13,500	3.3
208.4L**	6,900	11,700	1.7
211.1L	3,700	7,000	1.9
213.1L**	5,900	9,400	1.6
229.0R	13,100	41,000	3.1
230.5L	16,100	44,000	2.7

*Completed in fall of 1973.
**Completed in 1974.

1.08. The total Federal cost of the project including the completed sites in Tehama County is currently estimated at $3,570,000.

1.09. In view of current water resources policies and present conditions, the benefit-cost ratio for each new site which is being recommended for construction was computed at the current interest rate of 5-7/8 percent for comparison purposes. These ratios are listed in the following tabulation:

Site (River Mile)	B/C ratio
202.0R	2.0
202.4L	1.3
205.5L	-
206.1L	1.4
207.0L	2.0
211.1L	1.2
229.0R	1.9
230.5L	1.6

2.01. Environmental setting without the project. - The Sacramento River at Chico Landing has a drainage area of about 12,000 square miles. The Sacramento Valley proper extends from Red Bluff to Sacramento, a distance of about 120 miles, and varies in width from 10 miles to 40 miles. The evolution of the fertile Sacramento Valley involved a succession of countless river configurations and channel changes which continue even

today. The valley floor from Chico Landing to Red Bluff is approximately 40 miles long, and the width varies from 10 miles at Red Bluff to about 25 miles at Chico Landing. The elevation of the valley in this reach varies from 130 feet above mean sea level at Chico Landing to about 270 feet at Red Bluff. Flood plain width varies from 1 mile at Red Bluff to 4 miles at Chico Landing. The river distance in that reach is about 52 miles. The average water surface slope is about 2.5 feet per mile. The principal tributaries in the project reach are Antelope, Mill, Deer, and Pine Creeks from the east, and Elder, Thomes, and Stony Creeks from the west.

2.02. Hydrology and climate. - The climate of the valley is relatively mild with a mean temperature of 62° Fahrenheit, with the daily mean varying from about 40° to 85° from winter to summer. Although precipitation varies considerably, in general, the normal seasonal precipitation in the valley floor is about 20 inches which occurs mostly in the winter months. Average annual runoff at Chico Landing is 9 million acre-feet. The channel capacity in the project reach varies from 70,000 cubic feet per second at Red Bluff to 260,000 cubic feet per second at Chico Landing. Natural streamflows since 1902 have varied from a minimum of 2,400 cubic feet per second in August 1931 to a maximum in February 1940 of 291,000 cubic feet per second at Red Bluff but could have been regulated through Shasta Dam to a maximum discharge of 138,000 cubic feet per second. Maximum flow at Red Bluff since completion of Shasta Dam was 157,000 cubic feet per second in January 1970.

2.03. Transportation. - The Southern Pacific Railroad traverses the project area running north and south on both sides of the valley. Interstate Highway 5 runs north and south on the west side of the river, and California Highway 99 runs north and south on the east side of the river. Several State and improved county highways traverse the project area in an east-west direction. The existing project for commercial navigation on the Sacramento River above Chico Landing provides such depths as are practicable up to Red Bluff, with a minimum flow of 5,000 cubic feet per second below Chico Landing to be maintained by Shasta Lake and by supplemental channel improvements. The present controlling depth is 3 feet. The channel is maintained only as far upstream as Colusa. Factors which contribute to the lack of present commercial navigation in the project reach are the limited depth, steep gradient, and lack of adequate terminal facilities.

2.04. Existing Flood Control Projects. - Shasta Dam on the Sacramento River about 70 miles upstream from Red Bluff is a Federally constructed multipurpose reservoir which helps regulate flows in the Sacramento River in the project area. Objective flood-control releases are 79,000cubic feet per second at Keswick Dam, 100,000 cubic feet per second at Red Bluff, and 130,000 cubic feet per second at Ord Ferry.

2.05. The Sacramento River Flood Control Project adopted by the Flood Control Act of 1 March 1917 (6)(7) and modified by Flood Control

Acts of 1928 (8), 1941 (9), 1944 (10), 1950 (11), 1958 (2), and 1960 (12), and the River and Harbor Act of 1937 (13) is a joint Federal-State-Local venture which extends for nearly the full length of the Sacramento Valley. It includes (a) the Old Project; (b) Major and Minor Tributaries Project; and (c) the Sacramento River Bank Protection Project. The Old Project includes all works authorized prior to the Flood Control Act of 1944. The Major and Minor Tributaries Project was authorized in 1944 to provide supplementary works. The Sacramento River Bank Protection Project, authorized by the 1960 Flood Control Act, comprises a modification of the Sacramento River Flood Control Project to include a long-range program for construction of bank protection to existing project levees downstream from Chico Landing and on tributary streams. In addition to the bank protection completed in Tehama County under the Chico Landing to Red Bluff Bank Protection Project, work completed under Federally authorized flood-control projects in the project reach includes levees on Elder, Deer, Chico, and Mud Creeks, under the Major and Minor Tributaries Project, and riprap on Elder Creek under the Sacramento River Bank Protection Project. A very limited project for the Chico Landing to Red Bluff reach was authorized by the Flood Control Act of 1941, Public Law 228, 77th Congress (9), and has been completed. This project provided for channel clearing, rectification, snagging, and bank protection on the Sacramento River and tributaries in Tehama County from Red Bluff southerly. In addition, the Corps of Engineers performed some clearing and snagging and emergency flood-control work along the Sacramento River from Chico Landing to Red Bluff under authority of the Flood Control Acts of 1937, 1941, and 1948. Emergency flood fight and post-flood rehabilitation work on privately owned facilities under Public Law 81-875 (14) and Public Law 84-99, as amended, (15) has been accomplished at various times within the project reach.

2.06. Local interests have constructed levee systems in several locations on both riverbanks within the project reach. The more important flood-control works are the levee system around the town of Gerber and the west river levee upstream of Hamilton City. At Gerber the levees were of sufficient height to prevent inundation by the December 1937 and February 1940 floods, the largest of record. Partially effective levee systems are located on lower Antelope Creek, on the east bank of Sacramento River near the Squaw Hill Bridge, on both banks below Tehama-Butte County line, and on the left bank opposite Hamilton City. Some local levees have also been constructed on Pine, Rock, Chico, and Mud Creeks. With the exception of Gerber, Hamilton City, and Chico Creek levees, these flood-control works are inadequate and ineffective during large floods. These levees have no discernible effect on the bank protection project during large floodflows, since the levees are not extensive and do not confine the flows to a large extent. During low flow periods the water does not extend to the levees and, therefore, they have no effect on the bank protection works during low flow periods.

2.07. Land use. - Land use in the project reach is generally agricultural, although there are several small towns. The principal cities

are Chico, Hamilton City, Gerber, Tehama, and Red Bluff with populations of 20,800, 800, 775, 317, and 7,676, respectively, based on the 1970 census. Approximately 43,000 acres are under cultivation in the flood plain in the project reach. Much of the overflow land on which wildlife habitat is located is rapidly being converted to agricultural uses, gradually diminishing this habitat. This trend is expected to continue regardless of project construction. Principal crops are dry pasture, hay, grains, almonds, olives, oranges, sugar beets, and truck crops. About 27,000 acres are irrigated by diversion from the river (3).

2.08. The following is a description of the land use at each site:

2.09. Mile 194.0 Left Bank, Butte County - Site is adjacent to a county road which has been destroyed twice by erosion since 1970. Land use adjacent to the county road at the site is orchard and dryland pasture. Bidwell State Park is located at the downstream end of the site. Erosion has destroyed the vegetation on the waterside of the county road. The site is used extensively by fishermen because of easy public access to the river. Bank protection was constructed at this site in 1973.

2.10. Mile 196.3 Left Bank, Butte County - Adjacent to a county road with approximately 50 to 75 feet of berm remaining between the river and the road. There are 28 large oak trees adjacent to the river bank in the reach to be protected. Fishermen and campers currently use the area by trespass. Land adjacent to the county road is used for irrigated cultivated cropland. Bank protection was constructed at this site in 1973.

2.11. Mile 197.0 Right Bank, Glenn County - Approximately 50 percent of the adjacent land is orchard and 50 percent is irrigated pasture. There are approximately 1-1/2 acres of brush and small trees located at the center of the site. The irrigated pastureland is located in the primary designated floodway and could only be converted to a higher type agricultural use such as orchards. There is no public access to the river at this site.

2.12. Mile 202.0 Right Bank, Glenn County - A residence and associated structures are located adjacent to this site. The erosion has advanced to within 15 feet of the house and threatens its destruction. An undetermined number of trees have been lost, and the remaining four trees will be lost if the erosion process is not halted. The agricultural land adjacent to this site is used for dryland grain.

2.13. Mile 202.4 Left Bank, Butte County - Land adjacent to this site is currently used for dryland grain. There are no trees or brush located within the site. Adjacent land is in the primary designated floodway, and its highest use would be a more productive agricultural use such as orchards.

2.14. Mile 205.5 Left Bank, Butte County - The land adjacent to this site is used primarily for orchards, with the land immediately adjacent to the problem area not currently under cultivation. The uncultivated

land contains a dense cover of brush and riparian growth which is subject to being eroded away in the future.

2.15. Mile 206.1 Left Bank, Butte County - Adjacent land is orchard to the edges of the bank and has scattered willow and cottonwood trees on the bank slope. The area now in orchard is within the primary designated floodway, and use probably will not change regardless of construction of the bank protection. The area upstream and downstream of the site has a dense growth of riparian vegetation. This area could be converted to cropland in the future. There is no public access to the river at this site.

2.16. Mile 207.0 Left Bank, Butte County - The land adjacent to this site is in orchard with a dense growth of riparian vegetation adjacent to the river for a length of about 800 feet. This vegetation is subject to being lost if the erosion remains unchecked.

2.17. Mile 208.4 Left Bank, Butte County - At the downstream end of the site the adjacent land is orchard and is in the designated floodway. Use of the orchard is not likely to change regardless of project construction. The land adjacent to the upstream end of the site is used for irrigated row crops. There is a narrow strip of grassland with scattered oak and cottonwood trees located between the riverbank and the cropland along 1,200 feet of the site. The upper portion of the site is not in the designated floodway. Bank protection was constructed at this site in 1974. There is no public access to the river at this site.

2.18. Mile 211.1 Left Bank, Butte County - Land adjacent to this site is in orchard. A county road is located immediately adjacent to the erosion area. Riparian vegetation has been removed by the erosion process, and the road and orchard are threatened by the continuing erosion.

2.19. Mile 213.1 Left Bank, Butte County - Land use immediately adjacent to this site is dry pasture or grassland with some scattered trees; however, most of the land in the area is used for orchard. Land use immediately adjacent to the site could possibly convert to orchards regardless of project construction. Bank protection was constructed at this site in 1974.

2.20. Mile 229.0 Right Bank, Tehama County - The City of Tehama is located at site mile 229.0 right, and the erosion is about 3,500 feet long. Land use is primarily residential with most of the homes located within 50 feet of the river bank. A total of 18 residences occupy about 2,800 lineal feet of the river front through this reach. There is about 1,000 lineal feet of vacant land and 400 lineal feet of alfalfa field which abuts the bank. About 500 feet of river bank between E and F Streets has previously received bank protection provided under this project authority.

2.21. Mile 230.5, Left Bank, Tehama County - The community of Los Molinos is located at site 230.5 left. The erosion site is about 3,200 feet long extending along the bank above Mill Creek. Land use is devoted to walnut

orchard, dry pasture, a mobile-home subdivision, rural estates, and a mobile-home park.

2.22. Biological aspects. - The following paragraphs apply generally to the overall Sacramento River and are applicable to the erosion sites within the reach of this project.

2.23. One of the most significant environmental values of the Sacramento River is the abundant riparian vegetation associated with it. This vegetation consists primarily of oaks, cottonwoods, willows, and a lesser number of other tree species in conjunction with numerous species of shrubs, forbs, and grasses. These trees and shrubs frequently grow in dense stands which form a virtual riparian jungle and provide habitat for a wide variety of wildlife game species. The riparian vegetation, as well as emergent and submergent plant growth, forms an integral part of the riverine ecosystem and plays a key role in the maintenance of species diversity, especially at lower trophic levels. Game species include California quail, blacktail deer, pheasants, doves, and rabbits. Furbearers present are muskrat, beaver, red fox, gray fox, river otter, mink, opossum, long-tailed weasel, and raccoon. The following two endangered species are known to occur over a wide area which includes the project limits: southern bald eagle (Haliaeetus leucocephalus leucocephalus) and American peregrine falcon (Falco peregrinus anatum). The only rare species which has been observed within the project limits is the California yellow-billed cuckoo (Coccyzus americanus occidentalis) (16). The yellow-billed cuckoo is dependent on the dense, brushy type vegetation that exists throughout the Sacramento River system. The southern bald eagle and American peregrine falcon are not critically dependent on the riparian growth along the river but use the trees for roosting and perching areas. Agricultural lands, undeveloped slough areas, canal and ditch banks, and overflow areas in floodways provide considerable wildlife habitat, particularly for migratory waterfowl. The riparian vegetation along the banks is also important to many species such as ring-necked pheasant, California quail, and other nongame species. Nearly 200 species of birds frequent the Sacramento River and contiguous bottom lands annually. Whistling swans, species of seven geese, and 22 duck species are included in this figure. Sacramento Valley wintering waterfowl populations often exceed three million birds. The dense riparian vegetation is the principal nesting habitat in the Central Valley for the western blue grosbeak, western yellow-breasted chat, and California yellow-billed cuckoo. Because most of the land adjacent to the river is intensively farmed, riparian habitat is one of the few remaining places where some wildlife species can exist. Another value of the riparian vegetation is its contribution to the aesthetic character of the river. Portions of the waterways of the Sacramento River, particularly its upstream reaches, are very scenic.

2.24. The Sacramento River is the primary route for migratory waterfowl using the Pacific Flyway. Waterfowl are more dependent on the contiguous overflow and agricultural lands for resting and feeding areas than on the river channel proper.

2.25. The Sacramento River is an essential system for most of the anadromous fishery resource in California. One hundred percent of the white sturgeon and 90-95 percent of the American shad in California spawn in the Sacramento River system, while about two-thirds of the adult striped bass spawn in that system (17). It is estimated that 326,000 salmon and 39,200 steelhead trout enter the mouth of the Sacramento River. Besides having a sizeable sport fishery, the river also provides a significant commercial fishery (21). On the average, about 300,000 salmon migrate up the Sacramento River annually to spawn in the upper reaches of the river and tributary streams. This figure has been less in recent years. A run of this magnitude represents an adult population of over one million fish of which all but the 300,000 have been harvested by commercial or sport catch. In addition to the anadromous fishery, the Sacramento River supports a significant warm water fishery consisting of black bass, crappie, white catfish, channel catfish, bluegill, and other nongame species.

2.26. Archeological and Historical. - Review of the National Register of Historic Places (18) and the California Historical Landmarks (19) indicates that there are no known archeological or historical sites that will be affected by the authorized project. The project environmental statement has been coordinated with the National Park Service and the State Liaison Officer. An archeological survey of the erosion sites has been prepared by a private consultant, and his report concluded that there are no significant archeological sites affected by this bank protection project. Should any such sites be revealed during construction, work will be stopped until salvage of artifacts be accomplished before construction is continued.

2.27. Recreation aspects. - The Sacramento River system offers a variety of water-oriented recreation activities. Excellent fishing is available, although there is a lack of public access to many reaches of the river; boating, water skiing, hiking, and camping are popular. There have been no recent estimates of recreation use along the project reach of river, but the Sacramento River is an area of high recreation use. There are a number of private and commercial marinas and boat docking facilities available along the river providing services to the public.

2.28. The Sacramento River north of the city of Sacramento to Keswick Reservoir, and from the river's source to Shasta Lake, has been selected jointly by the Secretary of Interior and Secretary of Agriculture as a potential addition to the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act (Public Law 90-542; 16USC 1273 et. seg.) (20). The law names certain rivers in the nation that possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values and states that these rivers shall be preserved in a free-flowing condition and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. Section 5(d) of the Act requires that in all planning for the use and development of water and related land resources, Federal

agencies are to give consideration to potential national wild, scenic, and recreational river areas, and that the Secretaries of Interior and Agriculture are to determine which areas are to be evaluated for this purpose. A wild, scenic, or recreational river area eligible to be included in the system is a free-flowing stream and the related adjacent land area that possesses one or more of the above outstanding values. The law specifies that every wild, scenic, or recreational river in its free-flowing condition, or upon restoration to this condition, shall be considered eligible for inclusion in the national wild and scenic rivers system and, if included, shall be classified, designated, and administered as one of the following:

2.30. Wild river areas - those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2.31. Scenic river areas - those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

2.32. Recreational river areas - those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

2.33. A report on the Sacramento River from Sacramento to Keswick Dam is now being prepared by the Corps of Engineers pursuant to Section 5(c) of Public Law 90-542, as amended, in connection with the authorized Sacramento River Bank Protection Project, currently under construction, the Chico Landing to Red Bluff Project, and the Northern California Streams - Red Bluff to Shasta Investigation. This study will consider the impact of authorized work on the possible use of the river and adjacent land as a wild, scenic, or recreational river area, and in that connection, characteristics of the stream will be investigated as related to its potential as such an area. A draft of the report was sent to agencies and interested organizations in January 1975 for review and comment. The final report will be published in May 1975.

2.34. The "California Protected Waterways Plan" (21), published by the State of California Resources Agency, lists the Sacramento River as a Class I premium salmon and steelhead waterway as well as a Class I premium warm water fishery waterway. Also, the Sacramento River upstream to Red Bluff is listed as a premium waterway for striped bass and shad.

2.35. The "California Protected Waterways Plan" encompasses virtually all of California's aquatic habitat which has extraordinary values regarding scenery, fish and wildlife, or outdoor recreation. The program is not a governmental program with jurisdiction over the management

of waterways but is the result of an investigation which included the following:

2.36. The identification of those waterways of the State possessing extraordinary scenic, fishery, wildlife, or outdoor recreation resources.

2.37. The identification of the public interest, including all present and potential human demands, in the resources of such waterways and adjacent lands.

2.38. The identification of activities or conditions which diminish, or threaten to diminish, the resources of such waterways.

2.39. Proposed standards and requirements, and administrative and legislative actions, which would extend effective long-range protection to the extraordinary scenic, fishery, wildlife, or outdoor recreation values of such waterways and adjacent lands on a basis which would permit the development and management of other natural resources where compatible, including appraisals of estimated costs and alternative means of financing to achieve such protection.

2.40. The identification of select waterways which merit priority action due to the nature of their resources, and either or both the degree of public interest in such resources and the rapidity of diminution of such resources by human activities.

3.01. Relationship of the proposed action to land use plans. - Bank protection provided under this project is in conformance with land use plans of all three counties. As previously indicated, these counties enacted zoning ordinances for controlling the secondary floodway in conformance with requirements of the project authorization. Installations of bank protection is not expected to cause change in land use.

4.01. Environmental impact of the proposed action; Changes or conversions of environmental resources. - The placement of bank protection usually results in loss of riparian vegetation and associated values. Removal of vegetation will have an adverse effect on some species of fish by removing shade and food sources. Introduction of rock, on the other hand, will provide habitat for food source for other species. Maintenance of the completed bank protection works will also result in removal of wild growth from the rock on a regular basis to facilitate inspection, repair, and other operation and maintenance requirements that insure the integrity and usefulness of the bank protection. Such maintenance will be the responsibility of the State of California to comply with the requirements of legislation authorizing the project. Nonproject related maintenance requirements also necessitate vegetation removal; for example, adherence to State and local fire prevention laws. The following is a description of the expected changes of environmental resources at each site to be constructed in Butte and Glenn Counties:

4.02. Mile 194.0 Left Bank - This site is adjacent to a Butte County road which has been destroyed twice by erosion since 1970. Bank protection was completed at this site in 1973. There was no vegetation remaining at the site which was materially affected by the project construction. The site is just upstream from Bidwell State Park and is currently used extensively by fishermen. The Reclamation Board purchased rights-of-way in fee which will insure continued public access to the river at this site. Because no riparian vegetation was destroyed and land use will not change, no environmental changes are expected to occur at this site.

4.03. Mile 196.3 Left Bank - This site was constructed in 1973 and is adjacent to a Butte County road with about 60 to 75 feet between the road and the riverbank. There are 28 large oak trees with an undergrowth of herbaceous vegetation on the berm. The area is currently used extensively by fishermen and campers. Construction procedures as shown on Chart 3 permitted saving 23 of the 28 oak trees, most of the undergrowth above the rock, and virtually all of the berm area. The State has purchased fee title to the rights-of-way which will insure public access to the river. Construction will not cause any land use change; therefore, the only changes in environmental resources at this site was the loss of five large trees which would eventually be lost by erosion, and annual grasses which revegetated. Land use will not change due to the project. Most of the herbaceous vegetation was removed for construction.

4.04. Mile 197.0 Right Bank - Adjacent land is used for orchards and irrigated pasture with approximately 1-1/2 acres of brush and small trees located at the center of the site. Construction of the project will necessitate removal of about one-half acre of the brush and small trees, about 1 acre of orchard, and about 1 acre of irrigated pasture. This is a very active erosion site with an annual loss of about 6 acres per year. Construction of bank protection is not expected to cause land use changes. There is no public access at this site; therefore, the project will not affect recreation use.

4.05. Mile 202.0 Right Bank - Brush and other similar vegetative growth have been removed by erosion. The landowners adjacent to this site have been forced to remove two large trees as a result of the erosion. No additional trees will need to be removed in connection with construction of the project. The erosion has under cut a garage and threatens destruction of several residences. There is no public access to this site; therefore, there will be no change in recreation use caused by the project.

4.06. Mile 202.4 Left Bank - Adjacent land use is dryland grain farming with no riparian vegetation. Approximately one-half acre of land will be lost due to project construction. Approximately one-half acre is being lost annually by erosion. Construction of the project will not cause environmental changes or conversions at this site.

4.07. Mile 205.5 Left Bank - About one-half acre of brush and herbaceous undergrowth would be removed from this site to permit construction.

Removal of trees will not be required. Adjacent land is devoted to orchards which are set back from the river such that no orchard trees will be removed. There is no landward access to this site so that recreation use will not be affected.

4.08. Mile 206.1 Left Bank - Adjacent land is orchard with a narrow berm located between the orchard and the river. There are scattered willows and cottonwoods located on the berm. Construction of the project will require removal of approximately one-half acre of berm. Construction method will be as shown on Chart 3 to avoid the loss of trees. The berm is now being eroded at a rate of about one-half acre per year.

4.09. Mile 207.0 Left Bank - Approximately one-third acre of brush and herbaceous growth will be removed to permit construction. Trees at this site are set back from the bank and will not require removal. The project will provide protection to a road paralleling the riverbank and to the adjacent land which is planted in orchards. Although there is access to this site by using the adjacent road, the site is not used by recreationists; therefore, there will be no change in recreation use.

4.10. Mile 208.4 Left Bank - About 1-1/2 acres of bank will be removed to permit construction. The 1-1/2 acres will include one-half acre each of orchard, dryland grain, and riparian vegetation consisting of scattered oak and cottonwood trees with herbaceous undergrowth. The construction method shown on Chart 3 will be used to preserve as much riparian growth as possible. Approximately 2 acres are lost annually by erosion at this site. Construction is not expected to cause a change in land use. There is no public access at this site; therefore, recreation use will not be affected.

4.11. Mile 211.1 Left Bank - There is no riparian vegetation along this site, the vegetation having been previously lost due to erosion of the riverbank. The adjacent land is in orchard which is set back from the river such that no orchard trees will need to be removed for construction. The project will provide protection to a nearby road and to a private levee protecting the orchard lands. About four-tenths of an acre is being lost annually by erosion at this site. The site is occasionally used by recreationists, but construction of bank protection will not require all the berm and will not interfere with future recreation use at this site.

4.12. Mile 213.1 Left Bank - Bank protection was constructed at this site in 1974. Approximately 1 acre of grassland was removed for construction. Annual loss due to erosion is about 1 acre. The construction method shown on Chart 3 was used to prevent removal of some large oak trees near the center of the site. Construction is not expected to change the adjacent land use or recreation use of the area.

4.13. Mile 229.0 Right Bank - Approximately one-half acre will be excavated to prepare the bank slope for rock protection. Trees and shrubs

will be removed; trees which can be saved will be marked prior to construction. The number of trees to be removed is not known at this time. This site is next to the city of Tehama and construction of bank protection is not expected to induce change in the existing urban land use.

4.14. Mile 230.5 Left Bank - Riparian vegetation at this site has been substantially removed by the natural erosion process. Riparian vegetation to be removed during construction consists primarily of native grasses which will revegetate in a short period of time following construction. Access to the work area will be on existing roads which will eliminate environmental destruction of habitat for access purposes. About three-fourths of an acre will be removed in shaping the bank for placing the stone protection.

4.15. In addition to the changes listed above for each site, the general appearance of stone bank protection will reduce the existing aesthetic quality of the natural riverbanks in Butte and Glenn Counties as it has at the previously completed sites in Tehama County.

4.16. Beneficial and detrimental aspects. - Although construction will destroy approximately 8 acres of riparian lands, about 13 acres per year are currently being lost due to erosion at the thirteen sites, including those sites where bank protection was recently constructed. Thus the 8 acres lost by construction will prevent an annual loss of 13 acres of riparian lands and prevent damage to county roads, permanent residences and mobile homes. In addition, the bank protection will prevent potential land loss caused by a major channel change. The preparatory bank sloping operation will cause the loss of about 3-1/2 acres of riparian vegetation. This loss would generally be herbaceous vegetation which would usually be reestablished by volunteer growth. In areas where trees or significant wildlife habitat exist on the bank and soils are found to be stable, construction will be accomplished as shown on Chart 3. This type of construction will prevent removal of the vegetation by eliminating the bank sloping operation. Excess excavation will be spread on top of the bank in areas where trees or wildlife habitat will not be affected. Seeding and replanting with a mixture of soft chess (Bromis mollis) and annual ryegrass (lolium multiflorum) and willow sprigs will be accomplished above the rock in scarred areas and in spoil areas where volunteer growth will not occur. Maintenance procedures consist of removal of vegetation growing in the rock by mechanical or chemical methods to facilitate inspection and to identify rock failures should they occur. The use of chemicals to control vegetative growth will be in accordance with Federal and State regulations. A maintenance program for the plantings will be outlined in the maintenance manual which will be prepared after construction has been completed. Maintenance will be performed by local agencies such as the respective counties. Burning of combustibles (downed trees, roots, or brush) where necessary will be accomplished in conformance with local air pollution standards and controls and in compliance with the National Clean Air Act of 1970. During construction, dust from equipment operations will be controlled by keeping the area watered. Construction will be in rural areas where noise pollution will not be a problem. Construction will probably cause a localized temporary increase in turbidity;

however, experience at other bank protection construction sites indicates the increase will be within acceptable water quality standards (State and Federal Standards). Monitoring of the water quality will be conducted during construction. Monitoring of water quality and biological effects by the Corps of Engineers and others does not reveal any evidence of alteration of the environment of organisms in the river due to construction of the project. Except for the completed clearing and snagging work accomplished under the Flood Control Act of 1941, Public Law 228, there is no other Federally authorized flood-control project on the main stem of the Sacramento River between Chico Landing and Red Bluff; therefore, this bank protection project will not affect any other Federal flood-control project. The Sacramento River shallow draft navigation channel is maintained only as far upstream as Colusa. Limited depth and steep gradient make navigation above Colusa impractical. The bank protection project will not have any physical effect on navigation in the project reach; however, it will prevent erosion of material and deposition in the downstream navigation channel which will reduce maintenance dredging costs.

4.17. Remedial, protective, and mitigative measures. - The riprap would be placed on a 1 vertical on 2 horizontal slope rather than a standard 1 vertical on 3 horizontal to minimize removal of bank. Where large trees or significant wildlife habitat exist, construction will be as shown on Chart 3. This method of construction will prevent the loss of large trees and wildlife habitat. Seeding and planting of scarred areas above the rock will be accomplished in areas where it is necessary to remove vegetation and natural regrowth does not occur.

4.18. The Reclamation Board has purchased fee title to rights-of-way at site miles 194.0 and 196.3. This will assure public access to the river at these sites and will prevent development on the right-of-way. The designated primary floodway plan adopted by the Reclamation Board and County ordinances will control development in the project reach. This is a requirement of the project authorization.

4.19. Construction schedules will be directly coordinated with the California Department of Fish and Game to minimize interference with the movement of anadromous fish, either adults or young, through the construction areas. Specifications for construction will include standard environmental protection measures of the Corps of Engineers and will be coordinated with the Central Valley Regional Water Quality Control Board and fish and game agencies.

4.20. Measures will be taken to protect and preserve historical and archeological sites as provided by the National Historic Preservation Act of 1966, Public Law 89-665 (22). In the event that unforeseen finds are encountered, the National Park Service will be notified before construction continues.

5.01. Adverse environmental effects which cannot be avoided should the project be implemented. - Removal of riparian vegetation and replacement of the natural riverbank with stone bank protection will reduce the existing wildlife habitat and aesthetic quality of the river. This is a loss which cannot be completely avoided wherever bank protection is placed. Approximately 8 acres of riparian land will be removed by the bank sloping operation prior to installation of the bank protection. Each site and the land to be removed for construction have previously been described in paragraph 4.01 through 4.14.

6.01. Alternatives to the authorized action. - Deferring or deleting Federal bank protection would result in continued erosion and loss of bank area which supports riparian vegetation. Erosion at the estimated rate of approximately 13 acres per year in Butte, Glenn and Tehama Counties at these sites, and possible channel changes, would result in the loss of more land and riparian vegetation than will be removed for placement of the bank protection. In addition, residences will continue to be threatened with destruction.

6.02. Additional upstream reservoirs could, if constructed, store all flows in excess of downstream needs, thereby preventing erosion from high flows. However, this would not eliminate erosion at moderate or low flows. Additional reservoirs would have a greater adverse environmental impact by destroying more riparian vegetation and wildlife habitat in the reservoir areas than at the bank protection sites. Based on previous cost estimates for other projects in northern California, prepared by the Sacramento District, during preliminary evaluation of the erosion problems, upstream storage was not considered to be a viable alternative to bank protection. It should be noted that Iron Canyon Dam and Reservoir, which was to be located on the Sacramento River several miles north of Red Bluff, has been recommended for deauthorization by the Sacramento District Engineer because of its economic infeasibility and its serious adverse environmental impact.

6.03. Flatter bank slopes with vegetative protection have been considered. Bank slopes would have to be about 1 vertical on 5 horizontal instead of 1 vertical on 2 horizontal for riprap. This method is not economically feasible and is less effective than stone bank protection because it would need several seasons of low flow to become established. This method would require the acquisition of more land, approximately 15 acres, removal of the riparian vegetation, and at two sites would require that county roads be set back resulting in increased costs.

6.04. Specially fabricated concrete block bank protection could be used. This bank protection method was included in earlier cooperative studies in the Sacramento River Delta by the State of California and the Corps of Engineers. The method employs concrete blocks with voids to permit vegetative growth and presents a comparatively superior appearance from the standpoint of environmental considerations. The brief tests conducted on this method indicated that it is not fully effective in controlling

erosion, and it is more expensive than conventional riprap. Additional alternatve types of bank protection are continually studied. Studies on two such types were initiated in 1971; one employs discarded automobile tires bound in a continuous mat, and the other employs netting material to hold soil in place while vegetation is becoming established. Cost of these methods is about equal to cost of rock. The appearance of old tires is considered to have less aesthetic value than rock, which is more permanent. The netting is not commercially available in sufficient quantities to be given further consideration and is also less permanent. It has now been determined that netting is unsatisfactory due to its failure during floodflows.

7.01. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. - Provision of bank protection will result in the immediate loss of 3-1/2 acres of riparian vegetation and 3-1/2 acres of agricultural land; however, this vegetation and farmland would soon be lost due to erosion if the bank protection is not installed. The riparian growth adjacent to the proposed sites which will be disturbed consists of oak, willow, and cottonwood trees and herbaceous vegetation. Continuing erosion at the rate of 13 acres per year and a major channel change would destroy far more riparian land than the 8 acres which will be lost by construction of the project.

8.01. Irreversible and irretrievable commitment of resources which would be involved if the proposed action should be implemented. - Although the removal of approximately 3-1/2 acres of trees, brush, and herbaceous vegetation and 3-1/2 acres of agricultural land is considered to be an irreversible commitment of resources, it is not considered to be completely irretrievable as some vegetation will become reestablished.

9.01. Coordination with other agencies. - A "working paper" draft of this environmental statement was informally coordinated with all agencies known to have an interest in this project, including conservation groups and concerned individuals. Their comments, suggestions, and recommendations were utilized in the preparation of a draft environmental statement. The draft environmental statement was circulated for formal review to appropriate Government agencies and citizen groups. This review was completed and their comments incorporated into this final environmental statement. As noted in paragraph 1.05, the erosion sites at river miles 229.0 Right Bank, and 230.5 Left Bank, were added after publication of the draft statement. To obtain comments from those agencies most concerned with the impact of bank protection, a field inspection was made of the two sites by personnel from the U. S. Fish and Wildlife Service, California Department of Fish and Game, Department of Parks and Recreation, Department of Water Resources, and the Reclamation Board. Following the inspection, all agencies replied that they had no additional comments on the environmental statement and that their previous comments were applicable to these two sites (see appendix F). This report, containing comments on this draft, together with a Statement of Findings, has been submitted to the President's Council on Environmental Quality. The District Engineer will furnish copies to agencies and groups with whom the statement was coordinated.

9.02. Government agencies. - This statement has been coordinated with the following agencies and organizations:

9.03. Federal	Person contacted 1/
Environmental Protection Agency	James McGrath
Department of Interior	
U.S. Fish and Wildlife Service	Richard Lavender
Bureau of Outdoor Recreation	Orrin Beckwith
National Park Service	Ed Bullard
Bureau of Reclamation	Jim Wiley
Bureau of Land Management	
Department of Transportation	
Department of Commerce	
National Marine Fisheries Service	
National Oceanic & Atmospheric Administration	
Department of Agriculture	
Soil Conservation Service	

9.04. State of California	
Office of Intergovernmental Management	
Resources Agency	
Reclamation Board	George Spencer
Department of Fish and Game	John Hays Jerry Mensch
Department of Water Resources	
Central District	
Northern District	Gene Serr
Department of Parks and Recreation	Robert Hagy
Central Valley Regional Water Quality Control Board	Jim Petrie
Department of Conservation	Ed Gladdish
Department of Navigation and Ocean Development	Dennis Letl
Department of Public Health	Glen Browning

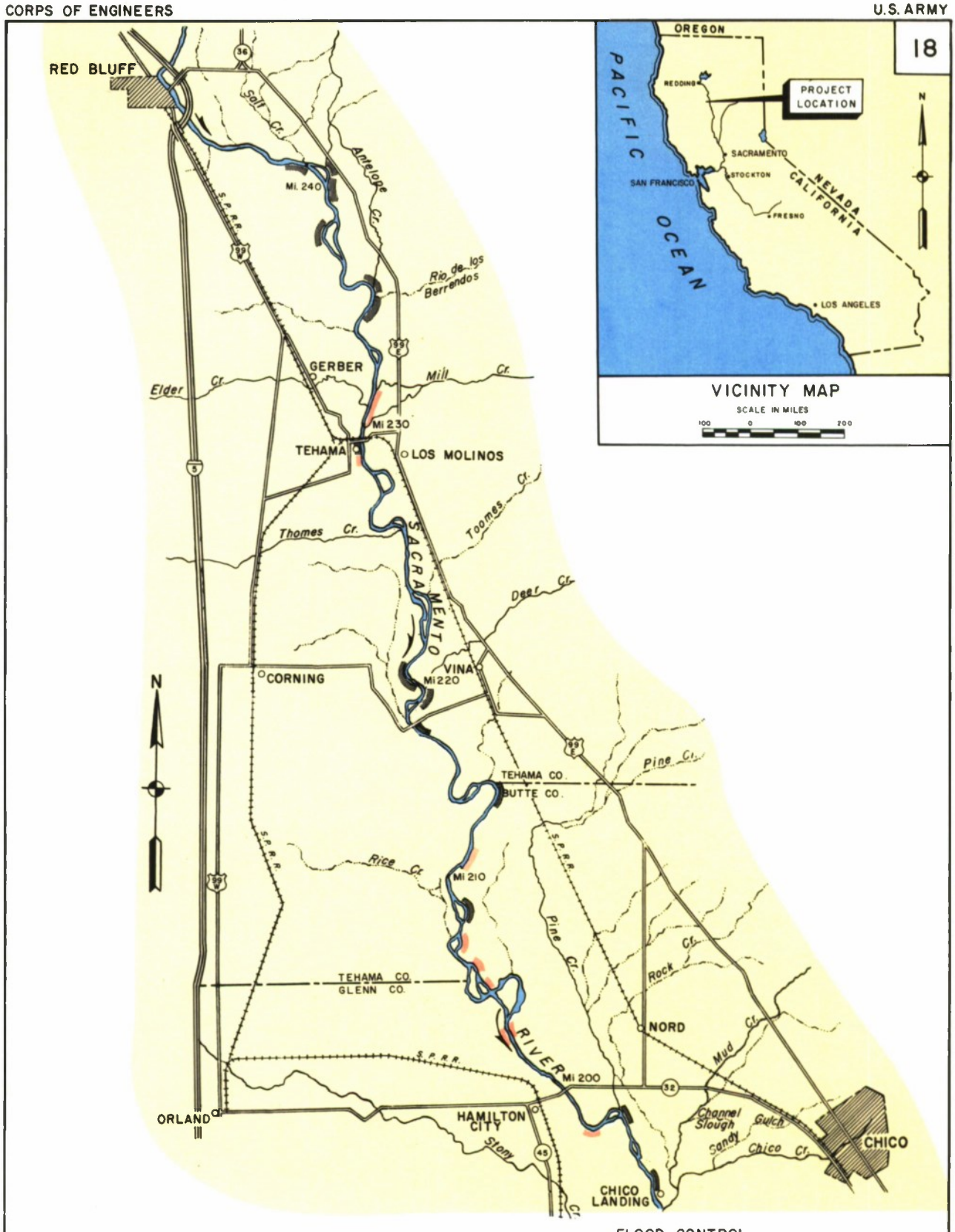
1/ Records do not indicate specific person contacted where no name is listed.

9.05. Counties and Local Agencies

Butte County	George Stamm
Glenn County	George Ellis
Tehama County	Larry Coleman
Chico	
Tehama	
Red Bluff	

9.06. Organizations

Sierra Club, Mother Lode Chapter	James Moose
Audubon Society, Altacol Chapter	Lynn R. Thomas
California Trout	Richard H. May
National Wildlife Federation	Jim Riech
California Natural Areas Coordination Committee	
Citizens Environmental Advisory Committee	Fred Styles
The Wildlife Society	
League of Women Voters	Sarah Frost



FLOOD CONTROL

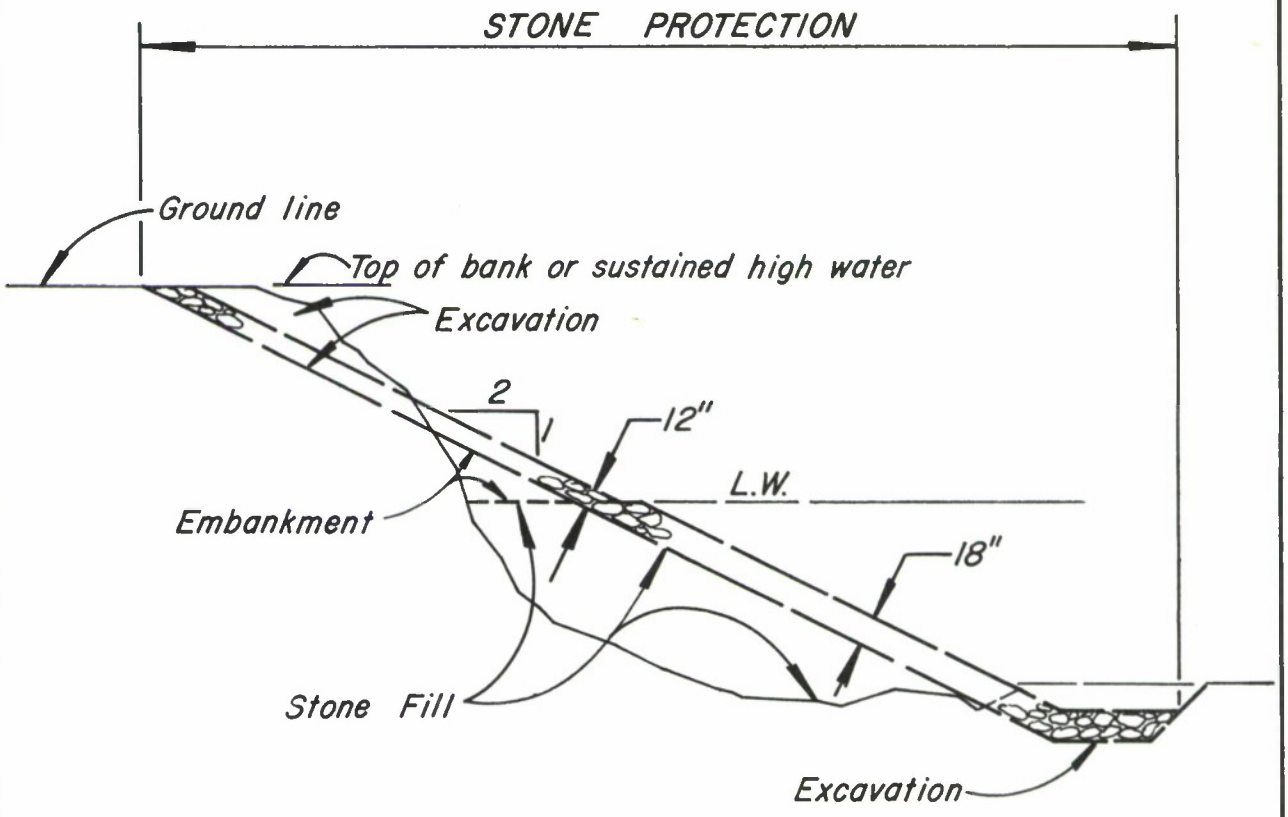
SACRAMENTO RIVER
CHICO LANDING TO RED BLUFF

CALIFORNIA

U.S. ARMY ENGINEER DISTRICT
SACRAMENTO, CALIFORNIA

REVISED 31 Dec. 1974

CHART 1



TYPICAL SECTION
STANDARD METHOD

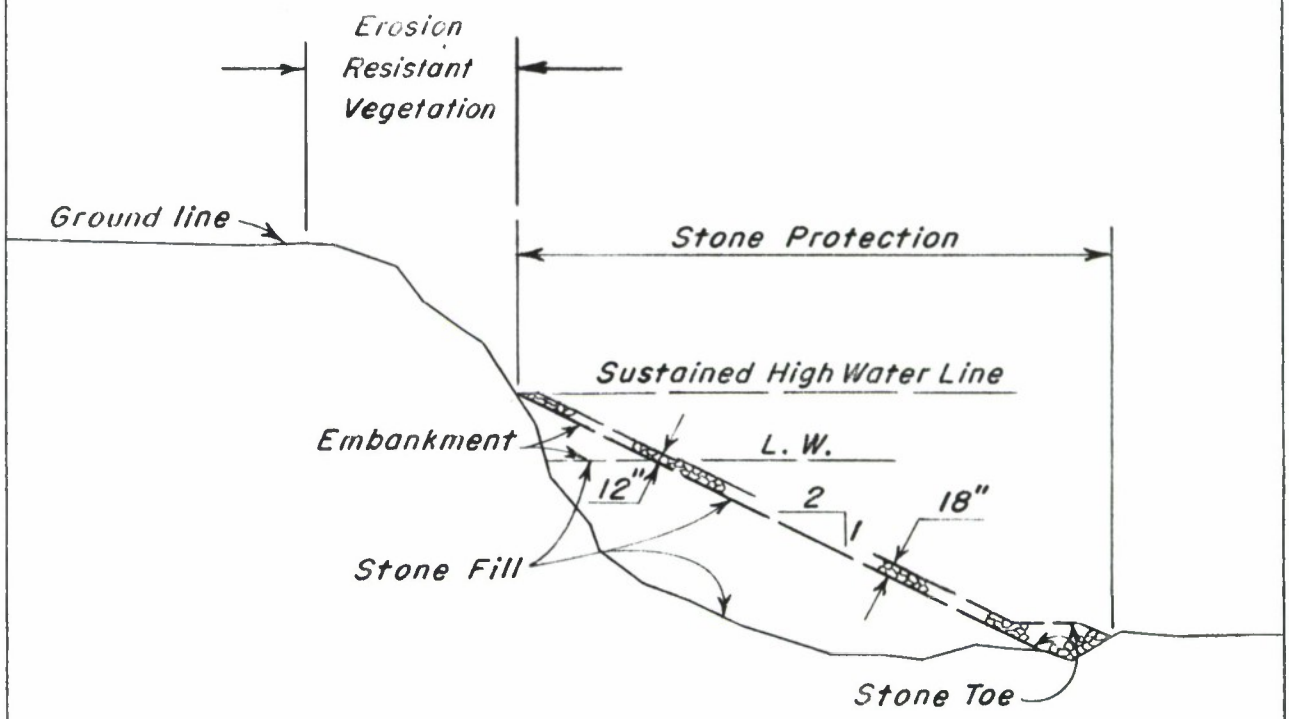
FLOOD CONTROL

SACRAMENTO RIVER
CHICO LANDING TO RED BLUFF

CALIFORNIA

U. S. ARMY ENGINEER DISTRICT
SACRAMENTO, CALIFORNIA

CHART 2



TYPICAL SECTION
MODIFIED METHOD

FLOOD CONTROL

SACRAMENTO RIVER
CHICO LANDING TO RED BLUFF
CALIFORNIA

U. S. ARMY ENGINEER DISTRICT
SACRAMENTO, CALIFORNIA

1 WAVE ACTION FROM BOAT WAKE

2 CONTRAST BETWEEN CONSTRUCTION METHODS

REFERENCES

(1) Civil Project Map, River and Harbor, Flood Control and California Debris Commission, Sacramento District, Corps of Engineers.

(2) Flood Control Act of 3 July 1958, Public Law 85-500, 85th Congress, 1st Session.

(3) House Document No. 272, 84th Congress, 2d Session, 17 May 1950.

(4) Design Memorandum No. 1, Sacramento River, California, Chico Landing to Red Bluff Bank Protection, General Design, 1 August 1961, US Army Engineer District, Corps of Engineers, Sacramento, California.

(5) Ordinance No. 1159, Butte County.

(6) Flood Control Act of 1 March 1917, Public Law 367, 64th Congress.

(7) River and Harbor Committee Document 5, 63rd Congress, 8 February 1913.

(8) Flood Control Act of 15 May 1928, Public Law 391, 70th Congress.

(9) Flood Control Act of 18 August 1941, Public Law 228, 77th Congress.

(10) Flood Control Act of 22 December 1944, Public Law 534, 78th Congress.

(11) Flood Control Act of 17 May 1950, Public Law 516, 81st Congress.

(12) Flood Control Act of 14 July 1960, Public Law 645, 86th Congress.

(13) River and Harbor Act of 26 August 1937, Public Law 392, 75th Congress.

(14) Federal Disaster Act of 1950, Public Law 875, 81st Congress.

(15) Public Law 99, 84th Congress, as amended by Section 206 of Flood Control Act of 23 October 1962.

(16) "At the Crossroads," January 1972, California Department of Fish and Game.

(17) "Ecological Studies of the Sacramento, San Joaquin Delta," Fish Bulletin 136, 1966, California Department of Fish and Game.

(18) "The National Register of Historic Places," 1969, United States Department of Interior, National Park Service.

(19) "California Historical Landmarks," April 1971, The Resources Agency of California, Department of Parks and Recreation.

(20) "Wild and Scenic Rivers Act of 1958," Public Law 90-542, approved 2 October 1968.

(21) "California Protected Waterways," February 1971, Resources Agency of California.

(22) "National Historic Preservation Act of 15 October 1966," Public Law 89-665.

(23) Glenn County Ordinances 548 and 549.

(24) U.S. Army Engineer District, Sacramento, Wild and Scenic Rivers Study, Sacramento River, Keswick Dam to Sacramento, Draft Preliminary Assessment of Stream Reaches, October 1973.

(25) Letter Report, 13 January 1970, Sacramento District, "Sacramento River, California, Chico Landing to Red Bluff; Request For Reactivation of Project."

APPENDIX A
FLORA OF THE PROJECT AREA

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SPECIAL VALUE		
		COMMON	OCCASIONAL	UNCOMMON	WILDLIFE	CULTURAL	AESTHETIC
TREES							
Arroyo willow *(Salix lasiolepis)*	Common–Pacific States	X					
Sandbar willow *(Salix hindsiana)*	Common–California and Oregon	X					
Black willow *(Salix gooddingii)*	Occasional–Nationwide		X				
Fremont cottonwood *(Populus fremontii)*	Common–Southwestern US	X					
Tree-of-Heaven *(Ailanthus altissima)*	Occasional–Introduced Spotty Distribution			X		X	
Oregon ash *(Fraxinus latifolia)*	Common–Pacific States		X				
White alder *(Alnus rhombifolia)*	Common–Pacific States	X					
Western sycamore *(Platanus racemosa)*	Occasional–California Valleys		X				X
Box elder *(Acer negundo)*	Common–Nationwide		X		X		
Valley Oak *(Quercus lobata)*	Common–California Valleys	X			X		
Black walnut *(Juglans hindsii)*	Uncommon–California Valleys		X				
Honey locust *(Robinia pseudoacacia)*	Occasional–Nationwide			X			
SHRUBS							
Buttonbush *(Cephalanthus occidentalis)*	Occasional–Wet Places Nationwide			X	X		
Wild grape *(Vitis californica)*	Common–California Southern Oregon	X			X		
Wild blackberry *(Rubus vitifolius)*	Common–Nationwide	X			X		
Blue elderberry *(Sambucus caerulea)*	Common–Nationwide		X		X		
Poison Oak *(Rhus diversiloba)*	Common–Pacific States	X			X		
Coyote brush *(Baccharis pilularis)*	Common–California; Oregon		X				

FLORA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SPECIAL VALUE		
		COMMON	OCCASIONAL	UNCOMMON	WILDLIFE	CULTURAL	AESTHETIC
SHRUBS (Cont'd)							
Mule fat *(Baccharis viminea)*	Common-Southwestern US			X			
California wild rose *(Rosa californica)*	Common-California and Oregon	X			X		
GRASSES							
Ripgut *(Bromus rigidus)*	Common-Introduced Nationwide	X					
Soft chess *(Bromus mollis)*	Common-Introduced Nationwide	X			X		
Six-weeks fescue *(Festuca octoflora)*	Common-Nationwide	X			X		
Bermuda grass *(Cynodon dactylon)*	Common-Southern States Across Nation	X					
Wild rye *(Elymus glaucus)*	Common-Western US		X				
Rye grass *(Elymus canadensis)*	Common-Pacific States North Across Nation	X					
Johnson grass *(Sorghum halepense)*	Common-California			X			
Rabbitfoot grass *(Polypogon monspeliensis)*	Common-Introduced Nationwide	X					
HERBACEOUS PLANTS							
Yellow-star thistle *(Centaurea solstitialis)*	Common-Pacific States	X			X		
Yellow sweet clover *(Melilotus indicus)*	Common-Nationwide		X		X		
White sweet clover *(Melilotus albus)*	Common-Nationwide		X		X		
Common yellow mustard *(Brassica campestris)*	Common-Nationwide	X			X		
Bull thistle *(Cirsium vulgare)*	Common-Pacific States	X					
Lamb's-quarters *(Chenopodium album)*	Common-Nationwide	X			X		
Cocklebur *(Xanthium strumarium)*	Common-Nationwide	X					

FLORA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SPECIAL VALUE		
		COMMON	OCCASIONAL	UNCOMMON	WILDLIFE	CULTURAL	AESTHETIC
HERBACEOUS PLANTS (Cont'd)							
California mugwort *(Artemisia douglasiana)*	Occasional-Pacific States		X				
Western ragweed *(Ambrosia psilostachya)*	Common-Western US	X			X		
Horsetail *(Equisetum hymale)*	Common-Nationwide	X					
Garden lippia *(Lippia nodiflora)*	Common-Central and Southern California	X					
Milk thistle *(Silybum marianum)*	Common-Nationwide		X				
Poison hemlock *(Conium maculatum)*	Common-Nationwide		X				
Leather root *(Psoralea macrostachya)*	Occasional-California			X			
Mexican tea *(Chenopodium ambrosioides)*	Common-Nationwide	X			X		
Curley dock *(Rumex crispus)*	Common-Nationwide	X					
Blue vervain *(Verbena hastata)*	Common-Pacific States		X				
Wild licorice *(Glycyrrhiza lepidota)*	Occasional-Western US		X				
Bindweed *(Convolvulus arvensis)*	Common-Nationwide	X					
Common aster *(Aster chilensis)*	Common-Pacific States	X					
Brown cyperus *(Cyperus niger)*	Occasional-Western US		X				
Tall umbrella sedge *(Cyperus eragrostis)*	Common-Pacific States		X				
Loosestrife *(Lythrum hyssopifolia)*	Occasional-Nationwide		X				
Spike-rush *(Heleocharis acicularis)*	Occasional-Nationwide		X				
Common plantain *(Plantago major)*	Common-Nationwide	X					
Nettle *(Urtica holosericea)*	Common-Nationwide	X					

APPENDIX B
FAUNA OF THE PROJECT AREA

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			ASSOCIATED HABITAT WITHIN PROJECT AREA				PROBABLE PROJECT IMPACT		
		COMMON	OCCASIONAL	UNCOMMON	RIPARIAN	PASTURE LAND	ORCHARD	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
MAMMALS											
Common opossum *(Didelphis marsupialis)*	Occasional- Nationwide		X		X	X				X	
California bat *(Myotis californicus)*	Common- Pacific States	X			X	X	X	X		X	
Black-tailed jackrabbit *(Lepus californicus)*	Common- West of the Mississippi River	X			X	X	X	X		X	
Audubon cottontail *(Sylvilagus audubonii)*	Occasional- West of the Mississippi River		X		X	X		X		X	
Beechy ground squirrel *(Otospermophilus beecheyi)*	Common- California to Central Wash.	X			X	X	X			X	
Botta pocket gopher *(Thomomys bottae)*	Common- Southwestern United States		X		X	X	X			X	
Western harvest mouse *(Reithrodontomys megalotis)*	Common- Nationwide	X			X	X	X	X		X	
Deer mouse *(Peromyscus maniculatus)*	Common- Nationwide	X			X	X	X	X		X	
Muskrat *(Ondatra zibethica)*	Occasional- Nationwide		X		X						X
Grey fox *(Urocyon cinereoargenteus)*	Occasional- Nationwide		X		X	X				X	
Coyote *(Canis latrans)*	Occasional- Nationwide		X		X	X				X	
Raccoon *(Procyon lotor)*	Occasional- Nationwide		X		X	X	X			X	
Mink *(Mustela vison)*	Uncommon- Nationwide			X	X						X
Striped skunk *(Mephitis mephitis)*	Common- Nationwide	X			X					X	
Spotted skunk *(Spilogale putorius)*	Occasional- Nationwide			X	X					X	
Black-tailed deer *(Odocoileus hemionus columbianus)*	Occasional- Coastal- Pacific States		X		X	X					X
Long-tailed weasel *(Mustela frenata)*	Occasional- Nationwide		X		X						X

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			ASSOCIATED HABITAT WITHIN PROJECT AREA				PROBABLE PROJECT IMPACT		
		COMMON	OCCASIONAL	UNCOMMON	RIPARIAN	PASTURE LAND	ORCHARD	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
MAMMALS (Cont'd)											
Badger *(Taxidea taxus)*	Uncommon–Nationwide			X	X	X				X	
River otter *(Lutra canadensis)*	Uncommon–Nationwide			X	X						X
Beaver *(Castor canadensis)*	Uncommon–Nationwide			X	X						X
Red fox *(Vulpes fulva)*	Occasional–Nationwide			X	X	X				X	
AMPHIBIANS											
Western spadefoot toad *(Scaphiopus hammondi)*	Occasional–Central-coastal Calif. South, Southwestern States		X		X	X	X	X		X	
Western toad *(Bufo boreas)*	Common–Western United States	X			X	X	X	X		X	
Pacific treefrog *(Hyla regilla)*	Common–Pacific States	X			X	X	X	X		X	
Bullfrog *(Rana catesheiana)*	Occasional–Nationwide		X		X	X	X	X		X	
REPTILES											
Western pond turtle *(Clemmys marmorata)*	Common–Calif. & Oregon		X		X						X
Western fence lizard *(Sceloporus occidentalis)*	Common–Pacific States	X			X	X	X	X		X	
Western skink *(Eumeces skiltonianus)*	Common–Pacific States	X			X	X	X	X		X	
Western whiptail *(Cnemidophorus tigris)*	Occasional–Western United States		X		X	X				X	
Southern alligator lizard *(Gerrhonotus multicarinatus)*	Occasional–Calif. & Oregon west of the Cascade-Sierra range		X		X	X	X	X		X	

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			ASSOCIATED HABITAT WITHIN PROJECT AREA				PROBABLE PROJECT IMPACT		
		COMMON	OCCASIONAL	UNCOMMON	RIPARIAN	PASTURE LAND	ORCHARD	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
REPTILES (Cont'd)											
Rubber boa *(Charina bottae)*	Occasional–Western United States		X		X					X	
Ringneck snake *(Diadophis punctatus)*	Occasional–Nationwide Spotty Distrib.	X			X	X	X	X		X	
Sharp-tailed snake *(Contia tenuis)*	Occasional–Pacific States			X	X	X	X	X		X	
Racer *(Coluber constrictor)*	Occasional–Nationwide		X		X	X	X	X		X	
Gopher snake *(Pituophis melanoleucus)*	Common–Nationwide	X			X	X	X	X		X	
Common kingsnake *(Lampropeltis getulus)*	Common–Nationwide		X		X	X	X	X		X	
Common garter snake *(Thamnophis sirtalis)*	Common–Nationwide	X			X	X	X	X		X	
Western terrestrial garter snake *(Thamnophis elegans)*	Occasional–Western United States		X		X	X	X	X		X	
Western aquatic garter snake *(Thamnophis couchi)*	Occasional–California		X		X					X	
Western rattlesnake *(Crotalus viridis)*	Occasional–Western United States			X	X					X	

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SEASONAL STATUS		ASSOCIATED HABITAT WITHIN PROJECT AREA					PROBABLE PROJECT IMPACT		
							RIPARIAN							
		COMMON	OCCASIONAL	UNCOMMON	RESIDENT	MIGRANT	MARSH	WOODED	PASTURE LAND	ORCHARDS	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
B I R D S														
Great blue heron *(Ardea herodias)*	Common-Nationwide	X			X		X	X	X					X
Green heron *(Butorides virescens)*	Occasional-Eastern (U.S.) Pacific States		X		X		X	X						X
Common egret *(Casmerodius albus)*	Common-Nationwide	X			X		X	X	X					X
Snowy egret *(Leucophoyx thula)*	Occasional-Nationwide			X	X		X	X						X
Black-crowned night heron *(Nycticorax nycticorax)*	Occasional-Nationwide			X	X		X	X						X
Mallard *(Anas platyrhynchos)*	Common-Nationwide		X		X		X	X						X
Wood duck *(Aix sponsa)*	Occasional-West Coastal States & Eastern U.S.		X		X		X	X						X
Sharp-shinned hawk *(Accipiter striatus)*	Common-Nationwide		X			X		X	X	X			X	
Coopers hawk *(Accipiter cooperii)*	Uncommon-Nationwide			X	X			X	X	X			X	
Red-tailed hawk *(Buteo jamaicensis)*	Common-Nationwide	X			X			X	X	X			X	
Red-shouldered hawk *(Buteo lineatus)*	Common-Calif., Eastern U.S.		X		X			X	X	X			X	
Sparrow hawk *(Falco sparverius)*	Common-Nationwide	X			X			X	X	X			X	
California quail *(Lophortyx californicus)*	Common-Pacific States	X			X			X	X	X	X		X	
Ring-necked pheasant *(Phasianus colchicus)*	Occasional-Spotty Distribution		X		X				X				X	
Killdeer *(Charadrius vociferus)*	Common-Nationwide	X			X		X	X	X	X	X		X	
Band-tailed pigeon *(Columba fasciata)*	Occasional-Pacific States			X		X		X		X			X	
Mourning dove *(Zenaidura macroura)*	Common-Nationwide		X		X			X	X	X	X		X	
Barn owl *(Tyto alba)*	Uncommon-Nationwide			X	X			X	X	X			X	
Screech owl *(Otus asio)*	Common-Nationwide		X		X			X	X	X			X	

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SEASONAL STATUS		ASSOCIATED HABITAT WITHIN PROJECT AREA					PROBABLE PROJECT IMPACT		
							RIPARIAN							
		COMMON	OCCASIONAL	UNCOMMON	RESIDENT	MIGRANT	MARSH	WOODED	PASTURE LAND	ORCHARDS	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
BIRDS (Cont'd)														
Great horned owl *(Bubo virginianus)*	Common-Nationwide		X		X			X	X	X			X	
Long-eared owl *(Asio otus)*	Occasional-Nationwide			X		X		X					X	
Short-eared owl *(Asio flammeus)*	Occasional-Nationwide			X		X	X		X				X	
Lesser nighthawk *(Chordeiles acutipennis)*	Occasional-Southwest U.S.			X		X	X		X				X	
White-throated swift *(Aeronautes saxatalis)*	Common-Southwest U.S.		X			X			X				X	
Black-chinned hummingbird *(Archilochus alexandri)*	Occasional-Southwest			X		X			X				X	
Anna's hummingbird *(Calypte anna)*	Common-California	X			X			X	X	X	X		X	
Belted kingfisher *(Megaceryle alcyon)*	Occasional-Nationwide		X		X		X							X
Red-shafted flicker *(Colaptes cafer)*	Common-Western U.S.	X			X			X	X	X			X	
Acorn woodpecker *(Melanerpes formicivorus)*	Common-South in Pacific States	X			X			X		X			X	
Lewis woodpecker *(Asyndesmus lewis)*	Occasional-Western U.S.		X			X		X					X	
Yellow-bellied sapsucker *(Sphyrapicus varius)*	Occasional-Nationwide		X			X		X		X			X	
Downy woodpecker *(Dendrocopos pubescens)*	Occasional-Nationwide		X		X			X		X			X	
Nuttall's woodpecker *(Dendrocopos nuttallii)*	Occasional-California			X	X			X		X			X	
Western kingbird *(Tyrannus verticalis)*	Common-Western U.S.	X				X		X		X			X	
Ash-throated flycatcher *(Myiarchus tuberculifer)*	Common-Pacific States	X				X		X		X			X	
Black phoebe *(Sayornis nigricans)*	Common-Extreme South-Western States	X			X		X	X					X	
Western flycatcher *(Empidonax difficilis)*	Common-Western U.S.	X				X		X					X	
Tree swallow *(Iridoprocne bicolor)*	Common-Nationwide		X		X		X	X						X
Bank swallow *(Riparia riparia)*	Common-Nationwide		X			X	X							X

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SEASONAL STATUS		ASSOCIATED HABITAT WITHIN PROJECT AREA					PROBABLE PROJECT IMPACT		
		COMMON	OCCASIONAL	UNCOMMON	RESIDENT	MIGRANT	RIPARIAN MARSH	RIPARIAN WOODED	PASTURE LAND	ORCHARDS	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
BIRDS (Cont'd)														
Scrub jay *(Aphelocoma coerulescens)*	Common–Southwest	X			X			X		X			X	
Yellow-billed magpie *(Pica nuttalli)*	Common–California Valleys only	X			X			X		X			X	
Common crow *(Corvus brachyrhynchos)*	Common–Nationwide	X			X			X	X	X	X		X	
Plain titmouse *(Parus inornatus)*	Common–South–South Western States	X			X			X		X			X	
White-breasted nuthatch *(Sitta carolinensis)*	Common–Nationwide except treeless Plains	X			X			X					X	
Wrentit *(Chamaea fasciata)*	Common–Coastal Pacific States	X			X			X					X	
Bewick's wren *(Thryomanes bewickii)*	Common–Nationwide	X			X		X	X					X	
Mockingbird *(Mimus polyglottos)*	Common–Nationwide	X			X			X	X	X			X	
Robin (Turdus migratorius)	Common–Nationwide	X			X			X	X	X	X		X	
Ruby-crowned kinglet *(Regulus calendula)*	Common–Nationwide	X				X	X	X					X	
Water pipit *(Anthus spinoletta)*	Common–Nationwide	X				X			X		X		X	
Starling *(Sturnus vulgaris)*	Common–Nationwide	X			X				X	X	X		X	
Yellowthroat *(Geothlypis trichas)*	Common–Nationwide	X			X		X	X					X	
Yellow-breasted chat *(Icteria virens)*	Common–Nationwide	X				X	X	X					X	
Yellow-headed blackbird *(Xanthocephalus xanthocephalus)*	Uncommon–Western U.S.			X	X		X							X
Red-winged blackbird *(Agelaius phoeniceus)*	Common–Nationwide	X			X		X		X		X			X
Bullock's oriole *(Icterus bullockii)*	Common–Western U.S.	X				X		X	X	X	X		X	
Brewer's blackbird *(Euphagus cyanocephalus)*	Common–Nationwide	X			X			X	X	X	X		X	
Brown-headed cowbird *(Molothrus ater)*	Common–Nationwide	X			X			X	X	X	X		X	

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	ABUNDANCE IN PROJECT AREA			SEASONAL STATUS		ASSOCIATED HABITAT WITHIN PROJECT AREA					PROBABLE PROJECT IMPACT		
		COMMON	OCCASIONAL	UNCOMMON	RESIDENT	MIGRANT	RIPARIAN MARSH	RIPARIAN WOODED	PASTURE LAND	ORCHARDS	ROW CROPS	BENEFIT	NEGLIGIBLE	ADVERSE
BIRDS (Cont'd)														
Black-headed grosbeak *(Pheucticus melanocephalus)*	Common-Western U.S.		X			X		X					X	
Blue grosbeak *(Guiraca caerulea)*	Occasional-Extreme South across U.S.			X		X		X					X	
House finch *(Carpodacus mexicanus)*	Common-Western U.S.	X			X			X	X	X	X		X	
American goldfinch *(Spinus tristis)*	Common-Nationwide	X			X			X		X			X	
Lesser goldfinch *(Spinus psaltria)*	Common-South-South Western U.S.	X			X			X	X	X	X		X	
Rufous-sided towhee *(Pipilo erythrophthalmus)*	Common-Nationwide	X			X			X		X			X	
Brown towhee *(Pipilo fuscus)*	Common-Calif., Oregon, Texas area	X			X			X		X			X	
Savannah sparrow *(Passerculus sandwichensis)*	Common-Nationwide	X				X			X		X		X	
Vesper sparrow *(Pooecetes gramineus)*	Common-Nationwide		X			X			X		X		X	
Lark sparrow *(Chondestes grammacus)*	Common-Nationwide		X		X				X		X		X	
Oregon junco *(Junco oreganus)*	Common-Western U.S.	X				X		X	X	X	X		X	
Chipping sparrow *(Spizella passerina)*	Common-Nationwide	X				X		X	X	X	X		X	
White-crowned sparrow *(Zonotrichia leucophrys)*	Common-Nationwide	X				X		X	X	X	X		X	
Fox sparrow *(Passerella iliaca)*	Common-Nationwide	X				X		X						X
Lincoln's sparrow *(Melospiza lincolnii)*	Occasional-Nationwide			X		X		X					X	
Song sparrow *(Melospiza melodia)*	Common-Nationwide	X			X		X	X	X	X	X		X	
*Calif. yellow-billed cuckoo *(Coccyzus americanus occidentalis)*	Threatened California			X	X			X						X
*American peregrine falcon *(Falco peregrinus anatum)*	Endangered-Western U.S.			X		X			X				X	
*Southern bald eagle *(Haliaeetus leucocephalus leucocephalus)*	Endangered-Nationwide			X		X		X					X	

*Threatened or Endangered Species

FAUNA OF THE PROJECT AREA
(Continued)

COMMON AND SCIENTIFIC NAME	ABUNDANCE AND RANGE IN THE UNITED STATES	SPAWNING HABITS		PROBABLE PROJECT IMPACT		
		ANADROMOUS	RESIDENT	BENEFIT	NEGLIGIBLE	ADVERSE
F I S H						
Chinook (King) salmon *(Oncorhynchus tshawytscha)*	Common–Pacific Coast San Diego North & Coastal Streams	X			X	
Steelhead *(Salmo gairdnerii gairdnerii)*	Common–Pacific Coast Baja North & Coastal Streams	X			X	
Striped bass *(Roccus saxatilis)*	Common–Atlantic Coast & introduced Pacific Coast	X			X	
American shad *(Alosa sapidissima)*	Common–Atlantic Coast & introduced Pacific Coast	X			X	
White sturgeon *(Acipenser transmontanus)*	Common–Pacific Coast	X			X	
Largemouth bass *(Micropterus salmoides)*	Common–Nationwide		X		X	
Smallmouth bass *(Micropterus dolomieui)*	Common–Nationwide		X		X	
Bluegill *(Lepomis macrochirus)*	Common–Nationwide		X		X	
Green sunfish *(Lepomis cyanellus)*	Common–Nationwide		X		X	
Warmouth *(Chaenobryttus gulosus)*	Common–Nationwide		X		X	
Black crappie *(Pomoxis nigromaculatus)*	Common–Nationwide		X		X	
White catfish *(Ictalurus catus)*	Common–Nationwide		X		X	
Channel cat *(Ictalurus punctatus)*	Common–Nationwide		X		X	
Brown bullhead *(Ictalurus nebulosus)*	Common–Nationwide		X		X	
Black bullhead *(Ictalurus melas)*	Common–Nationwide		X		X	
* Thicktail chub *(Gila crassicauda)*	Endangered–California		X			X

* Endangered Species

APPENDIX C

COMMENTS AND RESPONSES

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APPENDIX C

COMMENTS AND RESPONSES

1. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)

(1) Comment: EPA suggests that additional discussion be included in the final environmental statement on the status of the Corps' study investigating the impact of bank protection on the use of this portion of the Sacramento River as a potential Wild, Scenic or Recreational River.

Response: Additional information on the status of the Wild, Scenic and Recreation study has been added to the discussion of this study.

(2) Comment: EPA also suggested that additional information be presented that more clearly describes the details of maintenance of the completed bank protection works.

Response: More detailed information has been included in the description of maintenance of the project.

2. US DEPARTMENT OF THE INTERIOR

(1) Comment: Suggested that the final statement demonstrate that nearly 200 species of birds frequent the Sacramento River and contiguous bottom lands annually or seasonally. Whistling swans, seven species of geese, and 22 duck species are included in this listing. Sacramento Valley wintering waterfowl populations often exceed three million birds.

Response: This information has been incorporated into the text of the statement.

(2) Comment: Bank erosion protection along Sacramento River by riprap placement near the waterline should reduce detrimental effects on riparian wildlife habitat and aesthetic values. Fee acquisition of construction sites could also provide additional needed fishermen access.

Response: The State of California Reclamation Board provides the lands, easements, and rights-of-way for the project as a requirement of local cooperation. Recreation was not included in authorization of the project; however, the Reclamation Board will be requested to consider fee acquisition of lands at the time they are requested to proceed with land acquisition.

(3) Comment: The section describing environmental impact of the proposed action states that maintenance of completed bank protection works would require periodic vegetative removal. Additional information on the degree and scope of environmental damage and uncompensated vegetation loss resulting from annual or periodic maintenance should be included. The final statement should describe maintenance methods,

extent of perennial cover removal, and its environmental impact. This activity should also be discussed as an adverse environmental effect which could not be avoided with the project.

Response: See response 1 (2). Effects of periodic maintenance activity have been included in the paragraph on adverse environmental effects which would not be avoided with the project.

(4) Comment: Suggested that the final statement describe expected changes in river hydrologic characteristics if the project is constructed. The report should indicate if current deflections resulting from installation of bank protection structures would result in off-site loss of riparian vegetation and describe the number of acres involved.

Response: There is no known methodology to predict changes in river hydraulics resulting from installation of bank protection. Loss of off-site vegetation is expected to continue with or without the project and no estimate of loss of riparian vegetation or acreage can be made other than the annual erosion rate outlined in the text.

(5) Comment: Suggests that the recent studies of bank erosion be more clearly referenced and cited in the list of references.

Response: There are no known "recent" studies of bank erosion other than those cited.

(6) Comment: Bank erosion on Sacramento River upstream from Chico Landing is more likely caused by river flow than boat traffic.

Response: Concur. The statement has been revised to reflect this comment.

(7) Comment: Page 5 refers to channel velocities, ". . . excessively high during floodflows (10 ft/sec or greater.)" Suggested that the statement be changed to indicate whether these are average for a cross-section or maximum point velocities. Also, use of a criterion such as 10 ft/sec as a limiting velocity for design purposes should not be made without considering the type of bed and bank material that is typical for the river reach under study. Some kinds of bed and bank material are more resistant to erosion than others.

Response: The statement has been changed as suggested. Velocity of streamflow is not the only consideration, but is a major one in determining whether to extend the rock protection higher than the sustained highwater elevation. Types of soils are also considered in design of bank protection.

3. US DEPARTMENT OF COMMERCE

(1) Comment: Section 2.f. (p. 15) (now paragraph 2.22) contains a discussion of the values associated with the riparian vegetation along the Sacramento River. This discussion should point out that riparian vegetation, as well as emergent and submergent plant growth, forms an integral part of the riverine ecosystem and plays a key role in the maintenance of species diversity, especially at lower trophic levels.

Response: Concur. The discussion has been revised to incorporate this comment.

(2) Comment: Section 2.f. (p. 17) (now paragraph 2.25) last paragraph, discusses the Sacramento River fisheries. It should also point out that the Sacramento system is the principal contributor to the ocean sport and commercial fishery for chinook salmon. Perhaps catch figures should be included to show the magnitude of the fisheries.

Response: Concur; paragraph 2.25 has been revised to include catch figures.

(3) Comment: In Section 3.a. (now paragraph 4.01), which discusses environmental impacts, there is no mention of possible consequences to fisheries resources of removing streamside vegetation. Emergent, submergent, and riparian vegetation are important to fish production. Even the modified bank protection plan will eliminate much of this vegetation. Such vegetation is of particular importance in the life cycles of many organisms serving as food for downstream migrant anadromous fish.

Response: The effect on fisheries resources of removing streamside vegetation has been incorporated into the discussion.

(4) Comment: In Section 3.c. (now paragraph 4.20) suggests that the first sentence in the first paragraph be revised to read as follows: "Construction schedules will be directly coordinated with the California Department of Fish and Game to minimize interference with the movement of anadromous fish, either adults or young, through the construction areas."

Response: The sentence has been revised.

(5) Comment: In the discussion of alternatives and elsewhere in the threport, the fact is neglected that the evolution of the fertile Sacramento Valley involved a succession of countless river configurations, channel changes, etc. Channel changes are temporarily destructive to the land where erosion is occurring, but in the long term, there are no permanent losses involved. This may be the type of information that should be incorporated into Section 6.

Response: A statement concerning the evolution of the Sacramento Valley has been incorporated into the text. It is not agreed that no permanent losses are involved in channel meanders because dredging of eroded material is required to maintain downstream navigation channels.

4. US DEPARTMENT OF TRANSPORTATION

(1) Comment: The proposal will have positive benefits in providing slope protection at locations where County roads are immediately adjacent to the river. At three locations south of SR 32, considerable monies have been spent on storm damage to replace or repair roads effected by river erosion. These benefits do not appear as clear and positive as they could in the report.

Response: Benefits accruing from protection to state and county roads are included in the benefit-cost computation when appropriate. Costs and benefits of the project are summarized in the environmental statement. Details of computing these figures are contained in other project documents.

(2) Comment: The river turbidity is to be monitored during construction. We suggest that the turbidity also be measured prior to construction, so that actual increases can be quantified.

Response: Turbidity is monitored upstream from the construction site to determine conditions prior to construction. The regional Water Quality Control Board has accepted this method.

(3) Comment: When feasible, construction activities should be scheduled to conform to recommendations of those agencies charged with managing the fish and wildlife resources of the river.

Response: See comment and response to 3 (4) above.

5. US DEPARTMENT OF AGRICULTURE

(1) Comment: Suggests an effort should be made to obtain an adjacent strip of property along each bank so riparian vegetation can be restored along the river.

Response: The California Reclamation Board is required to provide the lands, easements and rights-of-way for this project. Acquisition of lands for environmental mitigation was not included in the project authorization. Such property acquisition would have to be authorized and funded by the State of California.

(2) Comment: Lana vetch should be included in the grass seed mixture suggested in the statement for treating disturbed areas. Also, it would prove helpful to use fertilizer (16-20-0 or equivalent) at 300 to 400 pounds per acre at the time of seeding.

Response: Concur; inclusion of Lana vetch in the grass mixture will be evaluated and incorporated in future specifications. Although not mentioned in the draft statement, fertilizer is required by the contract specifications to be applied at the rate of five pounds per 1,000 square feet.

6. STATE OF CALIFORNIA

(1) Comment: The statement on page 17 regarding historical and archeological resources needs further clarification. The draft statement indicates that no known archeological or historical sites will be affected; however, State Registered Historical Landmark No. 831, the Site of the first Posted Water Notice by Will Green, is located on the west bank of the Sacramento River three and one-half miles north of Hamilton City. In addition, State Point of Historical Interest, Glenn-011, Swifts Point, is located on the Sacramento River near Hamilton City and Glenn-011, the site of the First Frame House in Glenn County, is near the bank of the Sacramento River at the Glenn-Tehama County line. These sites are in the project area and attempts should be made to protect and safeguard the integrity of these sites.

Unregistered historical and archeological values may exist and efforts should be made to identify and safeguard sites of this nature. As the project is federally funded, compliance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment", is required.

Response: Although the sites that have been identified by the State Historic Preservation Office are in the general vicinity of the bank protection sites, they will not be affected by construction of the project. In April 1974, Dr. Keith Johnson of California State University at Chico conducted an archeological and historical survey of eight sites where bank protection is programmed in the near future. Based on his field reconnaissance, Dr. Johnson recommended archeological and historical clearance of all the sites with the possible exception of site Mile 202.0 at McIntosh Landing. Bank protection at that site would protect most of the cultural resources at McIntosh Landing and the adjacent Indian Village although Johnson stated that if the bank protection was not constructed prior to the winter flood season, another archeological field check should be made at this site and its cultural significance reevaluated. Since construction is not planned prior to the spring of 1975, another field reconnaissance will be conducted prior to construction. In addition, all items having any historical or archeological significance discovered in the course of any construction activities shall be carefully preserved. The Contractor constructing the bank protection work is required to leave any such archeological find undisturbed until proper authorities have been notified and investigate the find.

(2) Comment: Prior to project construction, an inventory of riparian vegetation should be prepared for each project site and its adjacent area and vegetation zones should be designated for preservation. Wherever possible, the bank protection work should accommodate these vegetation zones. Where installation of bank protection removes such vegetation, revegetation should be encouraged. The maintenance policy as stated on pages 21 and 22 of the EIS appears to be contrary to the preservation of scenic qualities of the river. This policy is extreme due to the nature of the project; this is a river bank rather than a levee. The imminent danger posed to adjoining property is erosion of unprotected river bank rather than inundation from a failing levee.

Response: An inventory of riparian vegetation is made prior to construction and cognizance is taken of this resource in design of the project. In addition, a post-construction survey is required by the project specifications. Maintenance of the bank protection requires removal of wild growth, but vegetation is permitted above the rock.

(3) Comment: Page 26 of (draft) EIS states that a preliminary assessment has been made by the Corps of this portion of the river as a possible addition to the Scenic and Wild Rivers System (PL 90-542) and further, that this portion has been suggested for a detailed study. In order to minimize the possibility of future works in the project area which might be in conflict with the above study, the Corps should make every effort to ensure an early completion of the study. We would appreciate information on its present status, and an opportunity to review the study report when completed.

Response: A draft of the wild and scenic river study will be published in January 1975 and the final report will be prepared about May 1975.

(4) Comment: We find no mention of the provisions for disposal of trees and brush that would be removed for the project. A definitive plan for the proper and safe handling and disposal of these wastes is needed to preclude adverse public health, safety, and environmental impacts. The wastes should be properly disposed of within the project area or in approved solid waste disposal site. The estimated quantity of solid wastes generated by the project, during and after construction, should be correlated with the solid waste activities of the counties involved.

Response: Disposal of trees and brush is described in the plans and specifications for the contract work. Specifications state that burning and disposal of waste material be in accordance with governing local and State regulations, and outline provisions for the health and safety to the public and environment.

(5) Comment: The Department of Fish and Game feels that the environmental statement should include at a minimum consideration of alternatives and mitigation for fish and wildlife losses due to flood control. The Department would like to reiterate its concerns that it would much prefer nonstructural alternatives to riprapping along the banks of the river.

Response: Alternatives to rock bank protection are discussed in paragraph six. Mitigation features such as seeding, planting, and preserving existing vegetation are also discussed.

(6) Comment: Recommended that paragraph 5a, "Alternatives to the authorized action," commencing on page 29 be expanded. The effects of deferring or delaying the project should be more fully explained. Also, the alternative of "no bank protection work" should be included and explained in adequate detail.

Response: Paragraph 5a (now 5.01) is the alternative of no bank protection work. More details are not available at this time because areas of future erosion cannot be predicted accurately.

7. DEPARTMENT OF PUBLIC HEALTH

(1) Comment: The draft is adequate from a public health viewpoint.

Response: None required.

8. BUTTE COUNTY

(1) Comment: Agrees with the overall concept of the proposed work, as each year the County, through bank erosion, suffers the loss of acres of irreplacable agricultural land and wildlife habitat and is threatened with the destruction of County roads and residences. Although a small acreage and habitat will be lost in the original preparatory bank sloping, the acreage and habitat protected from loss under project conditions will exceed the original loss in one year. The long term effects are quite evident, therefore, and the proposed work is considered to be environmentally sound.

Response: None required.

(2) Comment: The present proposed plan of construction at all sites calls for the rock protection to terminate at the sustained high water elevation. Recommends that the elevation of rock protection be evaluated at each individual site and that soil type, bank height and type of bank vegetation also be considered as governing criteria. The sandy loams at several of the sites could be very susceptible to erosion when floodflows exceeded the presently proposed rock elevations. The loss to land and habitat from floodflows could exceed the original cost and possible adverse environmental effect of extending the rock to top of bank. Since Butte County will probably be the maintaining agency for the sites within the County, it is concerned with undue maintenance costs that might result from inadequate rock protection.

Response: The potential problem of erosion occurring above the rock is recognized, and if, during preparation of plans and specifications, it is determined that the soils are subject to erosion and no adverse environmental impacts would result, the rock protection will be carried to the top of the bank. The statement has been revised to reflect this comment.

9. LANDON ENGINEERING AND SURVEYING INC. (FOR GLENN COUNTY BOARD OF SUPERVISORS)

(1) Comment: The Glenn County Board of Supervisors requested this firm to indicate that the draft Environmental Statement for the Sacramento River of California, Chico Landing to Red Bluff Bank Protection Project,

has been reviewed and that it adequately describes the contemplated project and provides an adequate assessment of the environmental impacts involved in the project.

Response: None required.

10. MAYOR OF CITY OF TEHAMA

(1) Comment: The report relates only to work to be done in Butte and Glenn Counties and not to work to be done in Tehama County. The city of Tehama believes very strongly that work must be done on the Sacramento River by way of rock work on the banks to prevent excessive losses of land. The report relates to the saving of twelve acres per year and certainly it is desirable to save this twelve acres of agricultural ground; however, that even at $1,000.00 per acre, the total savings would be somewhere in the neighborhood of $12,000.00 per year. In contrast, the city of Tehama, with a waterfront of approximately a half mile, valued at $100.00 a front foot by the County Assessor, represents a total valuation of approximately $250,000.00. The structures on the land must at least double this value. For this reason, an expenditure for bank protection in the city of Tehama is justified.

Response: Since publication of this draft statement, two additional sites have been identified in Tehama County and have been included in the statement. One of these erosion sites is located at the city of Tehama.

(2) Comment: The Environmental Impact Report on page 4 says that studies indicate the major cause of bank erosion was from wave action from the wakes of power boats. This may be in the counties of Butte and Glenn but doubt the validity of that argument in Tehama County. Without being able to demonstrate scientifically the correctness of this conclusion, it is believed that the bank loss in November was caused by maintaining the river at a very high level of flow, which thoroughly soaked the bank. When the flow was reduced, the bank was so saturated that it subsided, causing a loss of no less than 500 to 1,000 tons of soil.

Response: The cause of bank erosion has been modified in the text of the statement (paragraph 1.06).

11. CALIFORNIA TROUT

(1) Comment: The discussion of adverse environmental impacts during construction is conclusiory in nature and inadequately supported. There is no attempt to describe the degree of turbidity increase during construction nor to define "acceptable water quality standards." Monitoring methods are not described nor are the steps which will be taken if turbidity exceeds acceptable standards.

Response: The discussion of adverse effects is based on field surveys and studies to develop construction cost estimates, which reveal

certain environmental losses resulting from construction. The degree of turbidity increase during construction cannot be predicted and is one of the reasons a monitoring program is required. Acceptable water quality standards are obtained from the California Regional Water Quality Control Board and the Environmental Protection Agency. If turbidity during construction surpasses the acceptable standards the construction work is suspended until corrective measures are taken.

(2) Comment: The report does not discuss the degree to which microscopic organisms in the riverbed will be reduced in the area of each work site, both during and after construction.

Response: Monitoring of water quality and biological effects by the Corps of Engineers and others does not reveal any evidence of alteration of the environment of organisms in the river due to construction. This statement has been added to the text of the environmental statement.

(3) Comment: There is no discussion of the possibility of altered flow patterns in the river as a result of the project nor is there any discussion of the effect new flow patterns might have on the river environment. It would appear that this aspect of the project should be thoroughly studied and described in detail in the report.

Response: There is no known effect on the flow pattern of the river other than to retard the attempt by the river to form new channels through erosion of existing banks.

(4) Comment: The discussion of the benefit cost ratio of the "improvements" at each site is devoid of any substance. It is impossible to tell how either the annual "benefits" or the annual "costs" were determined. This is especially true insofar as they may relate to environmental factors.

Response: Discussion of the economics of the project and the benefit-cost ratio is included pursuant to directives requiring such information on economic impacts in addition to the environmental effects of proposed actions. The derivation of such costs and benefits is contained in other documents and no details are included in the environmental statement.

(5) Comment: The discussion of the cost benefit ratio and the discussion of alternatives should be completely rewritten so that environmental and financial benefits and costs are quantified or discussed in such a way so that an objective judgment on their value is possible. For instance, it is impossible to tell from the draft report whether any environmental costs were included for the loss of aesthetics in the river environment. The Corps does not hesitate to attribute "recreational benefits" to a project when it feels that the project will enhance recreation. Fair play would seem to dictate that a recreation "cost" should be attributed to any project when the recreational value of the surrounding environment is adversely affected.

Response: It is agreed that recognition should be given to "costs" of reduction in aesthetics where they can be identified and quantified. If they are not susceptible of being quantified, they are recognized in the statement by descriptive narratives. Reference to recreation benefits and costs is immaterial to this project, since recreation is not a project purpose and there are no recreation costs or benefits associated with the project.

(6) Comment: The entire report appears to be based on an incorrect assumption. That is, that the "improvements" at the various sites will result in a "saving" of land in the river area as a result of reduced soil erosion. However, soil erosion would appear to be nothing more than the river's gradually but constantly changing course. Changes in the course of the river do not ordinarily result in any net loss of land or riparian habitat when the entire river is viewed as a single unit. The gradual loss of riparian habitat in one area is usually replaced by new habitat in another. There is absolutely no discussion in the draft report of this aspect of the project. The report should not confine itself to a discussion of the project on eash isolated site. A comprehensive review of the effect of the project on riparian habitat in the entire river basin should be included in the report.

Response: The report (environmental statement) is not based on any assumptions, but is an evaluation of the impacts of the project on the human and natural environments. The statement describes the effects within the project area and is not intended to extend throughout the entire river basin.

(7) Comment: The discussion of alternatives is misleading in that it conveys the incorrect assumptions that the project will save riparian habitat for the river as a whole. It also fails to discuss the financial acceptability of various alternatives, such as the relocation of roads, orchards or other existing improvements.

Response: Relocation of inhabitants, utilities, roads, and other cultural features is not a feasible alternative.

(8) Comment: The report does not address the fact that the project may endanger riparian habitat in other sections of the river by encouraging manmade developments within the flood plain. Obviously if the public assumes that the Corps will expend government funds to protect such developments, they will become much more common and riparian habitat will be lost.

Response: There is no evidence available that the project would encourage manmade development within the flood plain and a statement to this effect is in the text of the environmental statement. The project was authorized to protect the lands and improvements already in the flood plain, and no developments are expected to result from construction of the project that would not occur in the absence of the project.

(9) Comment: Generally speaking, the report is very weak on documented support for many of the contentions made therein. This should be corrected in any subsequent drafts.

Response: Every effort has been made to insure that the statement contains information based on documented facts, known data, and that the assumptions are as objective as possible utilizing existing information.

12. LEAGUE OF WOMEN VOTERS OF REDDING

(1) Comment: Every economic analysis of the effects of a proposed project should include both environmental benefits and costs, meaning by costs, environmental values reduced or obliterated by the project and opportunities foreclosed by its construction. Also, a higher discount rate should be applied to projects already authorized by Congress, but not yet started, to permit a complete review of the projects that may not show a favorable benefit-cost ratio.

Response: Refer to comment number 11 (5) with regard to economic analysis. The discount rate is adequately described in the statement. The effect of the current discount rate of 5-7/8 percent is included in the statement, although not material.

(2) Comment: Dollar cost figures in the benefit-cost ratio should be included on the following points:

> There will be a net loss of 7 acres of rich potential alluvial land lost to future creation by the natural process of erosion. The slow process of erosion created by nature's channel changes the rich soil which eventually supports riparian vegetation. This net loss of rich alluvial soil is definitely a detrimental irreversible and irretrievable commitment of resources which would be involved if the proposed action should be implemented.

Response: The loss of 7 acres of land due to construction is included as an irreversible and irretrievable commitment should the project be constructed.

(3) Comment: An annual dollar cost should also be used in the cost benefit ratio to reflect the definite loss of recreational use due to the appearance of the stone bank protection's reduction of the existing aesthetic quality of the river banks in Butte and Glenn Counties as it has in the previously completed sites in Tehama County.

Response: Refer to comment number 11 (5).

(4) Comment: A site-by-site evaluation of turbidity from the project and its detrimental effect on water quality and fish loss should be figured as a cost. Fish become more vulnerable to predators as a result of disorientation from turbidity.

Response: Refer to comment number 11 (5). There is no known evidence of long-term impairment of water quality or loss of fish from construction of prior sites of this project.

(5) Comment: Future dollar costs seem to have been unavoidable because there has been no discussion at all in the report as to geographical hydrologic changes in the river. The bank changes in shape and structure will surely cause the river to change its course. There should be extensive environmental evaluation of the inevitable changes to the river hydrology caused by this bank protection.

Response: All river systems are hydraulically active and tend to change course as hydraulic energy is partially dissipated through erosion and other means. No exact science has been developed with which to predict future changes in the river alignment. Each erosion site is evaluated and design of bank protection is fitted to the conditions at each individual site if work at the site is economically and environmentally justified.

(6) Comment: The impact of quarry rock on the streambed and the effects of this alteration or the abundance of microscopic fauna at the bottom of the stream, must be studied and evaluated.

Response: Monitoring of water quality and biological effects by the Corps of Engineers and others has not revealed any evidence of alteration of biota.

13. MR. LOUIS R. HENRICH

(1) Comment: Found it hard to believe that "the major cause of bank erosion was from wave action from the wakes of power boats." States that it appears the major cause of bank erosion on the Sacramento River is due to the heavy flow of the river in wintertime and that it is after the winter floods that eroded and receded banks appear.

Response: Refer to comment number 10 (2).

(2) Comment: It appears that the river is a dynamic whole and that stabilization cannot be accomplished at any single site.

Response: A separate benefit-cost ratio for each site was required by the authorization of the project.

(3) Comment: Notes that the report considers only sites from Chico Landing to Red Bluff and that there are many sites further south in Glenn and Butte County where erosion is active.

Response: Another project, Sacramento River Bank Protection Project has been authorized for the levees on Sacramento River south of Chico Landing, and is currently under construction.

APPENDIX D

Comments Received

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

Colonel F. G. Rockwell, Jr.
Army Corps of Engineers
Sacramento District
650 Capitol Mall
Sacramento CA 95814

MAR 27 1974

Dear Colonel Rockwell:

The Environmental Protection Agency has received and reviewed the draft environmental statement for the Sacramento River, California, Chico Landing to Red Bluff Bank Protection Project.

Our review indicates that, for the most part, the draft statement adequately presents the environmental impact associated with this project. EPA commends the Corps for the use of the "modified method" for bank protection.

EPA's comments on this draft statement have been classified as Category LO-1. Definitions of the categories are provided in the enclosure. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the impact statement at the draft stage. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

EPA suggests that additional discussion be included in the final environmental statement on the status of the Corps' study investigating the impact of bank protection on the use of this portion of the Sacramento River as a potential Wild, Scenic or Recreational River. Also, it is suggested that additional information be presented that more clearly describes the details of maintenance of the completed bank protection works.

We appreciate the opportunity to comment on this draft EIS, and request that a copy of the final statement be submitted to this office when it is available.

Sincerely,

Paul DeFalco, Jr.
Regional Administrator

Enclosure

cc: Council on Environmental Quality, Wash., D.C. 20460
Attn: Editor, 102 Monitor

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

ER-74/203

April 10, 1974

Col. F. G. Rockwell, Jr.
District Engineer
Sacramento District
Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

Dear Col. Rockwell:

The Department of the Interior has reviewed the draft environmental statement for Sacramento River, Chico Landing to Red Bluff Bank Protection Project, Butte, Glenn, and Tehama Counties, California.

We suggest that the final statement demonstrate that nearly 200 species of birds frequent the Sacramento River and contiguous bottom lands annually or seasonally. Whistling swans, species of seven geese, and 22 duck species are included in this listing. Sacramento Valley wintering waterfowl populations often exceed three million birds.

Bank erosion protection along Sacramento River by riprap placement near the waterline should reduce detrimental effects on riparian wildlife habitat and esthetic values. Fee acquisition of construction sites could also provide additional needed fishermen access.

The section describing environmental impact of the proposed action states that maintenance of completed bank protection works would require periodic vegetative removal. Additional information on the degree and scope of environmental damage and uncompensated vegetation loss resulting from annual or periodic maintenance should be included. The final statement should describe maintenance methods, extent of perennial cover removal, and its environmental impact. This activity should also be discussed as an adverse environmental effect which could not be avoided with the project.

We suggest that the final statement describe expected changes in river hydrologic characteristics if the project is constructed. The report should indicate if current deflections resulting from installation of bank protection structures would result in off-site loss of riparian vegetation and describe the number of acres involved.

However, we suggest that the recent studies of bank erosion be more clearly referenced and cited in the list of references. Bank erosion on Sacramento River upstream from Chico Landing is more likely caused by river flow than boat traffic.

Page 5 refers to channel velocities, "...excessively high during flood flows (10 ft/sec or greater." We suggest that the statement be changed to indicate whether these are average for a cross-section or maximum point velocities. Also, use of a criterion such as 10 ft/sec as a limiting velocity for design purposes should not be made without considering the type of bed and bank material that is typical for the river reach under study. Some kinds of bed and bank material are more resistant to erosion than others.

We appreciate the opportunity to comment on this environmental statement.

Sincerely,

Webster Otis
Special Assistant to the Secretary

cc: OEPR, Washington, D. C.
BSF&W, Portland
BOR, San Francisco
NPS, San Francisco
USGS, Reston
BM, Washington, D. C.
BLM, Sacramento
BR, Sacramento

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

March 29, 1974

Colonel F. G. Rockwell, Jr.
District Engineer
Corps of Engineers
Department of the Army
650 Capitol Mall
Sacramento, California 95814

Dear Colonel Rockwell:

The draft environmental impact statement for Sacramento River, California, Chico Landing to Red Bluff Bank Protection Project, which accompanied your letter of 8 February 1974, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

Section 2.f. (p. 15) contains a discussion of the values associated with the riparian vegetation along the Sacramento River. This discussion should point out that riparian vegetation, as well as emergent and submergent plant growth, forms an integral part of the riverine ecosystem and plays a key role in the maintenance of species diversity, especially at lower trophic levels.

Section 2.f. (p. 17) last paragraph, discusses the Sacramento River fisheries. It should also point out that the Sacramento system is the principal contributor to the ocean sport and commercial fishery for chinook salmon. Perhaps catch figures should be included to show the magnitude of the fisheries.

In Section 3.a., which discusses environmental impacts, there is no mention of possible consequences to fisheries resources of removing stream-side vegetation. As mentioned in our comment above, emergent, submergent, and riparian vegetation are important to fish production. Even the modified bank protection plan will eliminate much of this vegetation. Such vegetation is of particular importance in the life cycles of many organisms serving as food for downstream migrant anadromous fish.

In Section 3.c., on remedial, protective, and mitigation measures, page 29, the first sentence in the first paragraph reads as follows: "Construction will be scheduled to minimize interference with spawning runs of anadromous fish due to increased turbidity or activity." We suggest that this sentence be revised to read as follows: "Construction schedules will be directly coordinated with the California Department of Fish and Game to minimize interference with the movement of anadromous fish, either adults or young, through the construction areas."

In the discussion of alternatives and elsewhere in the report, the fact is neglected that the evolution of the fertile Sacramento Valley involved a succession of countless river configurations, channel changes, etc. Channel changes are temporarily destructive to the land where erosion is occuring, but in the long term, there are no permanent losses involved. This may be the type of information that should be incorporated into Section 6.

Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you. We would appreciate receiving a copy of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION-REGION ~~SEVEN~~ Nine

ARIZONA
CALIFORNIA
HAWAII
NEVADA

450 Golden Gate Avenue, Box 36096, San Francisco, Calif. 94102

March 25, 1974

IN REPLY REFER TO:

9ED

Colonel F. G. Rockwell, Jr.
District Engineer
Department of the Army
Sacramento District
Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Dear Colonel Rockwell:

We have reviewed the Draft Environmental Impact Statement for the Chico Landing to Red Bluff Bank Protection Project and offer the following comments:

1. The proposal will have positive benefits in providing slope protection at locations where County roads are immediately adjacent to the river. At three locations south of SR 32, considerable monies have been spent on storm damage to replace or repair roads effected by river erosion. These benefits do not appear as clear and positive as they could in the report.

2. The river turbidity is to be monitored during construction. We suggest that the turbidity also be measured prior to construction, so that actual increases can be quantified.

3. When feasible, construction activities should be scheduled to conform to recommendations of those agencies charged with managing the fish and wildlife resources of the river.

We realize that the last two comments are somewhat out of our area of expertise, however, we believe that if they are incorporated into the project, the impacts to aquatic wildlife will be reduced. Thank you for this opportunity to review the subject Draft EIS.

Sincerely yours,

For
F. E. Hawley
Regional Administrator

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 1019, Davis, CA 95616

March 20, 1974

Colonel F. G. Rockwell, Jr.
District Engineer
Department of the Army
Sacramento District
Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Dear Colonel Rockwell:

The Soil Conservation Service acknowledges receipt of the draft environmental statement for the Sacramento River, California, Chico Landing to Red Bluff Bank Protection Project. Suggestions resulting from our review are as follows:

An effort should be made to obtain an adjacent strip of property along each bank so riparian vegetation can be restored along the river.

Lana vetch should be included in the grass seed mixture suggested in the statement for treating disturbed areas. Also, it would prove helpful to use fertilizer (16-20-0 or equivalent) at 300 to 400 pounds per acre at the time of seeding.

The project will have no effect on going or planned projects of the Soil Conservation Service. We appreciate the opportunity provided for review and comment.

Sincerely,

G. H. STONE
State Conservationist

cc: Richard Call, SCS, Red Bluff

NORMAN B. LIVERMORE, JR.
SECRETARY

RONALD REAGAN
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Navigation and
Ocean Development
Department of Parks and Recreation
Department of Water Resources

Air Resources Board
Colorado River Board
San Francisco Bay Conservation and
Development Commission
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

AUG 6 1974

Colonel Frederick G. Rockwell, Jr.
District Engineer
Sacramento District
U. S. Army Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

Dear Colonel Rockwell:

Your draft environmental impact statement "Sacramento River, Chico Landing to Red Bluff, Bank Protection Project", dated January 1974, which you submitted to the Office of Planning and Research (State Clearinghouse) within the Governor's Office, has been reviewed by the state agencies concerned. This review fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969.

The statement has been reviewed by the Department of Conservation, Fish and Game, Food and Agriculture, Health, Navigation and Ocean Development, Parks and Recreation, Transportation, and Water Resources; the State Lands Commission; the Air Resources Board; the Reclamation Board; the Solid Waste Management Board; and the State Water Resources Control Board.

We believe that the statement should place greater emphasis on scenic and recreational values and be strengthened in its consideration of structural and nonstructural alternatives.

Following are comments on various aspects of the project and the draft environmental impact statement.

Archeological and Historical Resources

The statement on page 17 regarding historical and archeological resources needs further clarification. The staff of the State Historic Preservation Officer does not have any record of previous correspondence on this project. The draft statement indicates that no known archeological or historical sites will be affected; however, State Registered Historical Landmark No. 831, the Site of the First Posted Water Notice by Will Green, is located on the west bank of the Sacramento River three and one-half miles north of Hamilton City. In addition, State Point of Historical Interest, Glenn-Oll, Swifts Point, is located on the Sacramento River near Hamilton City and Glenn-Oll, the Site of the First Frame House in Glenn County, is near the bank of the Sacramento River at the Glenn-Tehama County line. The sponsor should be aware that these sites are in the project area and should make every attempt to protect and safeguard the integrity of these sites.

The sponsor should also be aware that unregistered historical and archeological values may exist and that every effort should be made to identify and safeguard sites of this nature. As the project is federally funded, compliance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment", is required. Hopefully, the proposed archeological survey will identify archeological resources in the project area. For assistance with the identification of local historical sites, the sponsor may wish to contact the Butte County Historical Society, Law Library, Butte County Courthouse, Oroville, California 95965; the Tehama County Historical Landmarks Advisory Committee, Post Office Box 158, Red Bluff, California 96080; and the Glenn County Landmarks Committee, Post Office Box 161, Willows, California 95988.

Riparian Vegetation

Prior to project construction, an inventory of riparian vegetation should be prepared for each project site and its adjacent area. From their inventory, vegetation zones should be designated for preservation. Wherever possible, the bank protection work should accommodate these vegetation zones. Where installation of bank protection removes such vegetation, revegetation should be encouraged. Bank protection detail shown on Chart 3 and Photograph 2 of the EIS, or minimum use of exposed rock on the river bank is favored. The maintenance policy as stated on pages 21 and 22 of the EIS appears to be contrary to the preservation of scenic qualities of the river.

"Maintenance of the completed bank protection works will also result in removal of vegetation on a regular basis to facilitate inspection, repair and other operation and maintenance requirements that insure the integrity and usefulness of the bank protection."

It is felt that this policy is extreme due to the nature of the project; this is a river bank rather than a levee. The imminent danger posed to adjoining property is erosion of unprotected river bank rather than inundation from a failing levee. Periodic assessment of the river bank should be sufficient to determine potential high-danger zones.

Scenic and Wild Rivers

Page 26 of the EIS states that a preliminary assessment has been made by the Corps of this portion of the river as a possible addition to the Scenic and Wild Rivers System (PL 90-542) and further, that this portion has been suggested for a detailed study. In order to minimize the possibility of future works in the project area which might be in conflict with the above study, the Corps should make every effort to ensure an early completion of the study. We would appreciate information on its present status, and an opportunity to review the study report when completed.

Solid Waste Management

We find no mention of the provisions for disposal of trees and brush that would be removed for the project. A definitive plan for the proper and safe handling and disposal of these wastes is needed to preclude adverse public health, safety, and environmental impacts. The wastes should be properly disposed of within the project area or in an approved solid waste disposal site. The estimated quantity of solid wastes generated by the project, during and after construction, should be correlated with the solid waste activities of the counties involved.

Fish and Wildlife Concerns

The Department of Fish and Game feels that the environmental statement should include at a minimum consideration of alternatives and mitigation for fish and wildlife losses due to flood control. The Department would like to reiterate its concerns that it would much prefer nonstructural alternatives to rip-rapping along the banks of the river.

Alternatives

It is recommended that paragraph 5a, "Alternatives to the authorized action", commencing on page 29 should be expanded. The effects of deferring or delaying the project should be more fully explained. Also the alternative of "no bank protection work" should be included and explained in adequate detail.

Thank you for the opportunity to review and comment on the subject draft environmental impact statement.

Sincerely yours,

N. B. LIVERMORE, JR.
Secretary for Resources

By Paul L. Clifton

cc: Director of Management Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH No. 74021836)

STATE OF CALIFORNIA—HUMAN RELATIONS AGENCY

RONALD REAGAN, Governor

DEPARTMENT OF PUBLIC HEALTH

ROOM 14—2135 AKARD AVENUE
REDDING 96001

February 14, 1974

Department of the Army
Sacramento District Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Attention: F.G. Rockwell, Jr.
Colonel

Gentlemen:

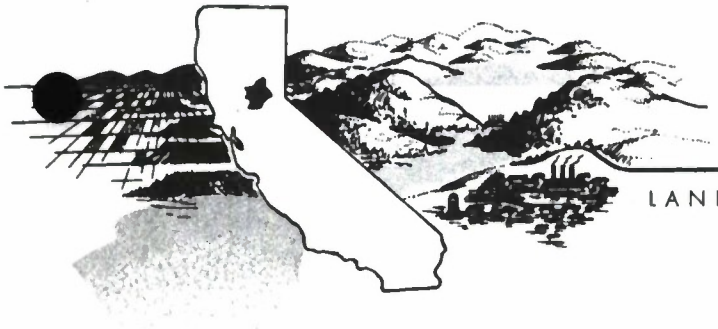
Review indicates the draft "Environmental Impact Statement" for the "Sacramento River, Chico Landing to Red Bluff Bank Protection Project" is adequate from a public health viewpoint.

Very truly yours,

George B. Gentry

George B. Gentry
Supervising Sanitary Engineer
Water Sanitation Section

GBG:as
cc: WSS - Berkeley
Sacramento



Butte County

LAND OF NATURAL WEALTH AND BEAUTY

COUNTY ADMINISTRATION BUILDING
OROVILLE, CALIFORNIA 95965
BOARD OF SUPERVISORS

JACK McKILLOP
District 1

JACK J. MADIGAN
District 3
Chairman

JAMES M. LADD
District 4

ART GILMAN
District 2

WARD CAMERON
District 5

March 7, 1974

Colonel F. G. Rockwell, Jr., District Engineer
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Dear Colonel Rockwell:

Thank you for the opportunity to review and comment on the draft environmental statement for the Sacramento River, Chico Landing to Red Bluff Bank Protection Project.

Butte County lies adjacent to the Sacramento River for approximately forty miles and is greatly affected, therefore, by the flow regimen of the river.

We are in agreement with the overall concept of the proposed work, as each year the County, through bank erosion, suffers the loss of acres of irreplacable agricultural land and wildlife habitat and is threatened with the destruction of County roads and residences. As pointed out in the environmental statement, although a small acreage and habitat will be lost in the original preparatory bank sloping, the acreage and habitat protected from loss under project conditions will exceed the original loss in one year. The long term effects are quite evident, therefore, and we consider the proposed work to be environmentally sound.

We are somewhat concerned, however, that the present proposed plan of construction at all sites calls for the rock protection to terminate at the sustained high water elevation. We would recommend that the elevation of rock protection be evaluated at each individual site and that soil type, bank height and type of bank vegetation also be considered as governing criteria. It is felt that the sandy loams at several of the sites could be very susceptible to erosion when flood flows exceeded the presently proposed rock elevations. The loss to land and habitat from flood flows could exceed the original cost and possible adverse environmental effect of extending the rock to top of bank. Since Butte County will probably be the maintaining agency for the sites within the County,

we are also concerned with undue maintenance costs that might result from inadequate rock protection.

Thank you again for the opportunity of expressing our views at this time.

Sincerely,

Jack Madigan

Jack Madigan, Chairman
Board of Supervisors

JM:gs:jm

LANDON
ENGINEERING
and
SURVEYING
INCORPORATED

103 South Plumas
P.O. BOX 789
(916) 934-7055
WILLOWS, CALIFORNIA 95988

MUNICIPAL • HIGHWAYS • AGRICULTURAL • LAND SURVEYS

March 7, 1974

Col. F. G. Rockwell, Jr. CE
District Engineer
Department of Army
Sacramento District Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Dear Sir:

The Glenn County Board of Supervisors requested that I advise you, that we have reviewed your draft Environmental Statement for the Sacramento River of California, Chico Landing to Red Bluff Bank Protection Project. Our only comment is that it adequately describes the contemplated project and provides an adequate assessment of the environmental impacts involved in the project.

Thank you for the opportunity to comment.

Very truly yours,

Thomas E. Landon
County Surveyor
County of Glenn

TEL/pw

City of Tehama *Incorporated*

C. A. STROMSNESS, Mayor

Tehama, California

Mailing address:
1207 Solano Street
Corning, CA 96021
Phone: (916) 824-5111

February 14, 1974

United States Army Engineer
Federal Building
650 Capitol Mall
Sacramento, CA 95814

Dear Sir:

I have received your Draft Environmental Impact Statement on the Sacramento River, Chico Landing to Red Bluff Bank Protection Project.

Evidentally, the report relates only to work to be done in Butte and Glenn Counties and not to work to be done in Tehama County. My purpose in writing to you is to say, first-off, that the City of Tehama believes very strongly that work must be done on the Sacramento River by way of rock work on the banks to prevent excessive losses of land. As you are aware, I am speaking of residential properties and not agricultural lands. The report which you have submitted relates to the saving of twelve acres per year and certainly it is desirable to save this twelve acres of agricultural ground. I bring to your attention, however, that even at $1,000.00 per acre, the total savings would be somewhere in the neighborhood of $12,000.00 per year. In contrast, the City of Tehama, with a waterfront of approximately a half mile, valued at $100.00 a front foot by the County Assessor, represents a total valuation of approximately $250,000.00. The structures on the land must at least double this value. This is the reason we feel that an expenditure for bank protection in the City of Tehama is justified and we hope that it can come into being.

I am also intrigued by the statement in the Environmental Impact Report on page 4, which says that studies indicate the

major cause of bank erosion was from wave action from the wakes of power boats. This may be in the Counties of Butte and Glenn but I very seriously doubt the validity of that argument in Tehama County. I have lived next to the river for almost ten years and have lost a considerable portion of bank myself. Without being able to demonstrate scientifically the correctness of my conclusion, I firmly believe that the bank which I lost was caused by maintaining the river at a very high level of flow in November, which thoroughly soaked the bank, and when the flow was reduced, the bank was so saturated that it subsided, causing a loss to me of what I am sure is no less than 500 to 1,000 tons of soil.

We appreciate the attention you have given to the bank protection problem and hope that in the foreseeable future, some studies may be made in the City of Tehama to consider protection work there.

Very truly yours,

C. A. STROMSNESS
Mayor

CAS:jn

CALIFORNIA TROUT

KEEPER OF THE STREAMS

March 21, 1974

F. G. Rockwell, Jr., Colonel
CE, District Engineer
Department of the Army
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Re: SPKED-F

Dear Colonel Rockwell:

California Trout has reviewed the Draft Environmental Impact Statement for the Sacramento River, California, Chico Landing to Red Bluff Bank Protection Project. We believe the statement is inadequate in a number of respects. Our comments are as follows:

(1) The discussion of adverse environmental impacts during construction is conclusiory in nature and inadequately supported. There is no attempt to describe the degree of turbidity increase during construction nor to define "acceptable water quality standards." Monitoring methods are not described nor are the steps which will be taken if turbidity exceeds acceptable standards.

(2) The report does not discuss the degree to which microscopic organisms in the river bed will be reduced in the area of each work site, both during and after construction.

(3) There is no discussion of the possibility of altered flow patterns in the river as a result of the project nor is there any discussion of the effect new flow patterns might have on the river environment. It would appear that this aspect of the project should be thoroughly studied and described in detail in the report.

(4) The discussion of the benefit cost ratio of the "improvements" at each site is devoid of any substance. It is impossible to tell how either the annual "benefits" or the annual "costs" were determined. This is especially true insofar as they may relate to environmental factors.

P. O. BOX 2046 · SAN FRANCISCO, CALIFORNIA 94126

(5) The discussion of the cost benefit ratio and the discussion of alternatives should be completely rewritten so that environmental and financial benefits and costs are quantified or discussed in such a way so that an objective judgment on their value is possible. For instance, it is impossible to tell from the draft report whether any environmental costs were included for the loss of aesthetics in the river environment. The Corps does not hesitate to attribute "recreational benefits" to a project when it feels that the project will enhance recreation. Fair play would seem to dictate that a recreational "cost" should be attributed to any project when the recreational value of the surrounding environment is adversely effected.

(6) The entire report appears to be based on an incorrect assumption. That is, that the "improvements" at the various sites will result in a "saving" of land in the river area as a result of reduced soil erosion. However, soil erosion would appear to be nothing more than the river's gradually but constantly changing course. Changes in the course of the river do not ordinarily result in any net loss of land or riparian habitat when the entire river is viewed as a single unit. The gradual loss of riparian habitat in one area is usually replaced by new habitat in another. There is absolutely no discussion in the draft report of this aspect of the project. The report should not confine itself to a discussion of the project on each isolated site. A comprehensive review of the effect of the project on riparian habitat in the entire river basin should be included in the report.

(7) The discussion of alternatives is misleading for the reason set forth above in that it conveys the incorrect assumptions that the project will save riparian habitat for the river as a whole. It also fails to discuss the financial acceptability of various alternatives, such as the relocation of roads, orchards or other existing improvements.

(8) The report does not address the fact that the project may endanger riparian habitat in other sections of the river by encouraging man-made developments within the flood plain. Obviously if the public assumes that the Corps will expend government funds to protect such developments, they will become much more common and riparian habitat will be lost.

(9) Generally speaking, the report is very weak on documented support for many of the contentions made therein. This should be corrected in any subsequent drafts.

Respectfully submitted,

CALIFORNIA TROUT

By: _____
DANIEL S. FROST

DSF/dh

League of Women Voters of Redding

March 22, 1974

F. G. Rockwell, Jr., Colonel
CE, District Engineer
Department of the Army
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Re: Comment on Draft Environmental Impact Statement, Sacramento River, California, Chico Landing to Red Bluff Protection Project

Dear Colonel Rockwell:

The League of Women Voters of Redding, California, in their review of the Environmental Impact Statement, has the following comments:

The Army Corps' report of the adverse environmental effects is inadequate in many areas and should include the following points in the final statement:

1. Every economic analysis of the effects of a proposed project should include both environmental benefits and costs, meaning by costs, environmental values reduced or obliterated by the project and opportunities foreclosed by its construction. Also, a higher discount rate should be applied to projects already authorized by Congress, but not yet started, to permit a complete review of projects that may not show a favorable benefit-cost ratio.

Dollar cost figures in the benefit-cost ratio should be included on the following points:

1. There will be a net loss of 7 acres of rich potential alluvial land lost to future creation by the natural process of erosion. The slow process of erosion created by nature's channel changes the rich soil which eventually supports riparian vegetation. This net loss of rich alluvial soil is definately a detrimental

irreversible and irretrievable committment of resources which would be involved if the proposed action should be implemented.

2. An annual dollar cost should also be used in the cost benefit ratio to reflect the definite loss of recreational use due to the appearance of the stone bank protections reduction of the existing aesthetic quality of the river banks in Butte and Glenn Counties as it has in the previously completed sites in Tehama County.

3. A site-by-site evaluation of turbidity from the project and its detrimental effect on water quality and fish loss should be figured as a cost. Fish become more vulnerable to predators as a result of disorientation from turbidity.

4. Future dollar costs seem to have been unavoidable because there has been no discussion at all in the report as to geographical hydrologic changes in the river. The bank changes in shape and structure will surely cause the river to change its course. There should be extensive environmental evaluation of the inevitable changes to the river hydrology caused by this bank protection.

5. The impact of quarry rock on the stream bed and the effects of this alteration or the abundance of microscopic fawna at the bottom of the stream, must be studied and evaluated.

Very truly yours,

LEAGUE OF WOMEN VOTERS OF REDDING

By: Sara Frost

SARA FROST

SF/dh

Louis R. Henrich
Rt. 1, Box 152
Glenn, Calif. 95943
March 19. 1974

U. S. Engineer District
Sacramento, Calif.

Gentlemen:

Thank you for the 1974 Draft Environmental Impact Statement on the Sacramento River, California, Chico Landing to Red Bluff Bank Protection Project.

Assuming that it is desirable to stabilize the river by preventing major channel changes and hence to prevent bank erosion, loss of riparian lands, etc., I wish to discuss some aspects of the draft.

1. Major cause of bank erosion.

On page 4, it is stated that, "the major cause of bank erosion was from wave action from the wakes of power boats." I find this hard to believe for various reasons. It may be true in lakes where there is no significant current. It appears to me that the major cause of bank erosion on the Sacramento River is due to the heavy flow of the river in winter time. It is after the winter floods that eroded and receded banks appear. I note the following:

a. The main use of power boats is in the summer, but during the summer the river is usually fairly clear. It is in the winter during the high floods that the river is loaded with debris and brown with mud.

b. I would expect erosion caused by boat wakes would be pretty uniformly distributed along the bank whether straight or curved. But the erosion I note, takes place on the curved banks the river strikes against as it flows downhill.

c. Even the majority of the places you choose to protect, as shown in chart 1, would seem to confirm that it is the action or the river, not of the power boats that causes erosion. Most of these sites seem to be where the current, as it flows downstream, is deflected by a bank.

2. Choice of Sites to Defend:

On page 6, you state, "A benefit-cost ratio has been calculated for each site rather than for the entire project It appears to me that the river is a dynamic whole. If A, C, represent successive bends in the river as it flows, one cannot stabilize at B if A is not stabilized. For if A is not stabilized it moves downstream, and eventually the current deflected from the new location, A', will hit the opposite bank at a point B' futher downstream than the protected site.

A good example of this may be seen, I believe, on the topographic map for the Llano Seco quadrangle 7.5 Min series, 1969 revision, between miles 181 and 183. The west bank is protected by rip - rap at about mile 182. However, the curve near mile 183 has been moving downstream, so that now the current strikes the west bank futher down stream than the protected bank, below mile 182, about opposite Hites Landing. Hence erosion now takes place at an unprotected site on the west bank, since the east bank at mile 183 was not stabilized.

I conclude the piece meal approach is almost a waste of time and money.

3. Other Sites in Glenn and Butte Counties:

I note that the report considers only sites from Chico Landing to Red Bluff. There are many sites further south in Glenn and Butte County where erosion is actively proceeding. Has other legislation provided for protecting sites further south than Chico Landing? Should not these sites also be protected if the river is to be stabilized?

In summary, I believe, that:

1. The major cause of erosion along the Sacramento River must be due to the flow of water in the river, not the wakes from power boats.

2. The river must be treated as a dynamic whole.

3. Erosion takes place further south than Chico Landing.

Hence, it is necessary:

1a. To question whether the modified plan (see chart 3) of bank protection is adequate.
2a. To calculate benefit-cost ratios for the river as a whole.
3a. To protect additional sites to the south of Chico Landing.

Sincerely,

Louis R. Henrich

Louis R. Henrich

APPENDIX E
TECHNICAL GLOSSARY

AMBIENT. - Surrounding on all sides.

ANADROMOUS. - Migrates to fresh water to spawn.

ANNUAL. - Pertaining to yearly occurrence.

AVERAGE ANNUAL DAMAGES. - The weighted average of all damages that would be expected to occur yearly under specified economic conditions and development.

BENEFIT-COST RATIO. - The arithmetic proportion of estimated average annual benefits to average annual costs, expressed in monetary terms. A measure of the degree of tangible economic justification of a project.

BENEFITS. - Increase of gains, not of associated at induced costs, in the value of goods and services which result from conditions within the project, as compared with conditions without the project. Benefits include tangibles and intangibles and may be classed as primary and secondary.

BERM. - The area between the waterside toe of a levee and the edge of the streambank.

COMMON. - Encountered regularly and in considerable numbers in project area.

COST SHARING. - The process of making contributions, by those benefiting from a project, towards the cost of that project.

DESIGN FLOOD. - The flood magnitude selected for use as a criterion in designing flood protective or control works.

ECOLOGICAL IMPACT. - The total effect of a change, either natural or manmade, in an environment upon the ecology of the area.

ECOLOGY. - The study of the interrelationships of organisms with and within their environment. The existing relationship of organisms within their environment.

ECOSYSTEM. - A community and its (living and nonliving) environment considered collectively.

ECONOMIC JUSTIFICATION. - A demonstration that: (1) project benefits exceed project costs; (2) each separable segment or purpose provides benefits at least equal to its costs; (3) the scale of development is such as to provide the maximum net benefits; and (4) there are no more economical means of accomplishing the same purpose which would be precluded from development of the project area undertaken.

ENDANGERED SPECIES. - Species that are in danger of becoming extinct.

ENVIRONMENTAL QUALITY. - Human (individual or social) considerations of desirable ecological situations.

FISH KILL. - Pertaining to sudden death of fish population.

FLOOD. - A great flow of water along a water course as a flow causing inundation of lands not normally covered by water.

FLOOD DAMAGES. - All economic losses resulting from a flood.

FLOOD PLAIN. - Land bordering a stream and which receives overbank flow.

FLOODPROOFING. - A combination of structural changes and adjustments to properties subject to flooding primarily for the reduction of flood damages.

FLOWAGE EASEMENT. - A permit to allow for passage or temporary storage of floodwaters without a transfer of land ownership.

HISTORICAL FLOOD DAMAGE. - Flood damage measured by the prices and conditions existing at the time of a particular flood.

MULTIPLE-PURPOSE PROJECT. - A project designed to serve more than one purpose; for example, irrigation, flood control, recreation, and hydroelectric power.

MIGRANT. - Observed for periods during the migration of the particular species.

OCCASIONAL. - Encountered occasionally in project area.

ONE-HUNDRED YEAR FLOOD. - A flood having an average frequency of exceedence in the order of about once in 100 years, but could occur two or more years in a row.

RARE - Not abundant in any location and confined to a relatively small and specialized habitat.

RESIDENT. - Found all year within the region.

RIPARIAN VEGETATION. - Vegetation growing on the banks of a stream or other body of surface water.

STANDARD PROJECT FLOOD. - A hypothetical flood representing the most critical flood benefit volume and peak discharge that may be expected from the most severe combination of meteorologic and hydrologic conditions that are considered reasonably characteristic for the hydrologic region involved, including extremely rare combinations.

UNCOMMON. - Found infrequently in project area.

VECTOR. - An organism that carries a disease, parasite, or infection.

VECTOR CONTROL. - Process of controlling a disease, parasite, or infection by control of the carrier.

WATER QUALITY. - A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

WATER RESOURCE COUNCIL. - The Council established by the Water Resource Planning Act, PL 89-80, composed of the Secretaries of Interior; Agriculture; Army; Health, Education and Welfare; and Transportation; and the Chairman of the Federal Power Commission.

G.P.O. 689-240/4504

APPENDIX F

SPKED-F 6 December 1974

MEMO FOR RECORD

SUBJECT: Sacramento River, Chico Landing to Red Bluff; Inspection of Erosion Sites at Tehama and Los Molinos

1. Floodflows in Sacramento River during the period January-April 1974 caused extensive erosion at several locations in Tehama County. Following inspections of the area with County and State representatives, and following a public meeting conducted by Representative H. T. "Bizz" Johnson in Los Molinos on 18 April 1974 to consider problems on Sacramento River in this area, it was determined that urgent action was necessary to prevent further loss of property and possible loss of homes at two sites. It is proposed to add two new erosion sites in Tehama County to the Letter Supplement No. 1 to the General Design Memorandum and the Environmental Statement for this project. The sites are located at river miles 229.0 right bank (City of Tehama), and 230.5 left bank (Los Molinos). At this time the draft Environmental Statement has been fully coordinated and comments have been received. In order to maintain the construction schedule, the environmental impact of providing bank protection at these two additional sites in Tehama County is being coordinated informally to determine if there are any serious objections to the work. On this date a meeting was held with fish and wildlife and local interests to inspect the subject erosion sites and to obtain their comments for inclusion in the environmental statement for the project. Those attending the field trip were:

John Hays	Fish and Game, Northern District
Bob O'Brian	Fish and Game, Northern District
Bob Steel	DWR, Northern District
Dale Wilson	Department of Parks and Recreation
George Spencer	State Reclamation Board
Jim Carson	U. S. Fish and Wildlife Service
Bob House	U. S. Fish and Wildlife Service
Larry Coleman	Tehama County
Jack Bernard	Corps of Engineers
Roger Janssen	Corps of Engineers

2. A short meeting was held in Mr. Coleman's office to discuss the purpose of the field inspection and review the location of the erosion sites by map and aerial photographs.

3. The site at the City of Tehama (site mile 229.0 right) was inspected first. The riverbank is covered with a dense growth of trees in this reach and most questions were directed to whether or not the trees would be saved. I pointed out that if the rock protection is carried to the top of the bank, the trees on the bank slope would be removed. Also, some trees would need to be removed for equipment access, but that every effort would be made to preserve as many trees as possible.

4. The Los Molinos site (site mile 230.5 left) was then inspected in the vicinity of the Barrett property. The primary concern at this site was how we proposed to accomplish the work without removing the house. I indicated the method of construction would be determined during design.

5. I reiterated that only comments that were pertinent to the contents of the environmental statement were being solicited at this time, particularly if the comments would be substantially different than those provided from the review of the draft EIS. There were no serious objections to providing bank protection at these two sites. All parties agreed to contact the undersigned by 13 December 1974 to advise me of any comments they might have.

R. G. Janssen

R. G. JANSSEN
Asst Chief, Lev & Chans Sec

cc: Levees
Engr Div (2)
Wtr Res Plng
Env Plng Sec
Stowell

Supplement:

1. Telephone calls were received from Mr. Spencer, State Reclamation Board on 10 December 1974; Mr. John Hays, Department of Fish and Game on 10 December 1974; Mr. Jim Carson, U. S. Fish and Wildlife Service on 11 December 1974; each stating that the comments furnished on the draft environmental statement are applicable to these two new sites and that no additional comments would be required.

2. It is concluded and agreed that comments previously received on the draft environmental statement are applicable to these two new sites and no additional comments are required.

Roger Janssen
ROGER JANSSEN
Corps of Engineers

John M. Hays
JOHN HAYS
Fish and Game, Northern District

George W. Spencer (representing)
GEORGE SPENCER
State Reclamation Board

James D. Carson
JIM CARSON
U. S. Fish and Wildlife Service

Robert a Steel
BOB STEEL
DWR, Northern District

for Lon E. Wilson
DALE WILSON
Department of Parks and Recreation

R O'Brian
BOB O'BRIAN
Fish and Game, Northern District

TO: Defense Technical Information Center
ATTN: DTIC-O
8725 John J. Kingman Road, Suite 0944
Fort Belvoir VA 22060-6218

22 October 2008

FROM: US Army Corps of Engineers
Sacramento District Library
1325 J Street, Suite 820
Sacramento CA 95814-2292

SUBJECT: Submission of technical reports for inclusion in Technical Reports Database

The enclosed documents from USACE Sacramento District are hereby submitted for inclusion in DTIC's technical reports database. The following is a list of documents included in this shipment:

ADB344304 • Lemon Reservoir Florida River, Colorado. Report on reservoir regulation for flood control, July 1974

ADB344333 • Reconnaissance report Sacramento Metropolitan Area, California, February 1989

ADB344346 • New Hogan Dam and Lake, Calaveras River, California. Water Control Manual Appendix III to Master Water Control Manual San Joaquin River Basin, California, July 1983

ADB344307 • Special Flood Hazard Study Nephi, Utah, November 1998 (cataloged)

ADB344344 • Special Study on the Lower American River, California, Prepared for US Bureau of Reclamation – Mid Pacific Region and California Dept. of Water Resources..., March 1987

ADB344313 • Transcript of public meeting Caliente Creek stream group investigation, California, held by, the Kern County Water Agency in Lamont, California, 9 July 1979

ADB344302 • Initial appraisal Sacramento River Flood control project (Glenn-Colusa), California, 10 February 1989

ADB344485 • Report on November-December 1950 floods Sacramento-San Joaquin river basins, California and Truckee, Carson, and Walker rivers, California and Nevada, March 1951

ADB344268 • Reexamination Little Dell Lake, Utah, February 1984

ADB344197 • Special report fish and wildlife plan Sacramento River bank protection project, California, first phase, July 1979

ADB344264 • Programmatic environmental impact statement/environmental impact report Sacramento River flood control system evaluation, phases II-V, May 1992

ADB344201 • Hydrology office report Kern river, California, January 1979

ADB344198 • Kern River – California aqueduct intertie, Kern county, California, environmental statement, February 1974

ADB344213 • Sacramento river Chico Landing to Red Bluff, California, bank protection project, final environmental statement, January 1975

ADB344265 • Cottonwood Creek, California, Information brochure on selected project plan, June 1982

ADB344261 • Sacramento river flood control project Colusa Trough Drainage Canal, California, office report, March 1993

ADB344343 • Detailed project report on Kern River-California aqueduct intertie, Kern County, California. February 1974

ADB344267 • Sacramento River Flood Control Project, California, Right Bank Yolo Bypass and Left Bank Cache Slough near Junction Yolo Bypass and Cache Slough, Levee construction, General Design, Supplement No. 1 to Design Memorandum #13, May 1986

ADB344246 • Redbank and Fancher Creeks, California, General Design Memorandum #1, February 1986

ADB344260 • Cache Creek Basin, California, Feasibility report and environmental statement for water resources development Lake and Yolo counties, California, February 1979

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